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PETHIDINE IN LABOUR: RESULTS IN 500 CASES

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The search for the ideal analgesic agent for use in obstetrics has continued for very many years and innumerable agents have been recommended. Pethidine is a comparative newcomer to this field, and although it has already received extended trial its value, uses, and limitations do not seem to be as well known as they should be. This article embodies the results of its use in over 500 cases in the Obstetric Unit at University College Hospital between the years 1942 and 1946.

Chemistry and Pharmacology of Pethidine

Pethidine is 1-methyl-4-phenyl-piperidine-4-carboxylic acid ethyl ester hydrochloride. In Germany, where it was originally discovered, and in South America it is known as "dolantal" or "dolantin." In the U.S.A. and Canada it is known as "demerol," and it has also been known as S-140 and D-140. It is unfortunate that these different names have come into use in different countries, since it leads to confusion. The original description was given by Eisleb and Schaumann (1939), who introduced it as a synthetic substitute for atropine. They found that it not only possessed spasmolytic powers similar to those of atropine but also was antagonistic to acetylcholine, tended to depress the action of smooth muscle, and had a marked analgesic effect. Dietrich (1939) as a result of clinical trial found pethidine useful as an antispasmodic and analgesic.

Duguid and Heathcote (1940) found that pethidine has no haemolytic effect on erythrocytes and no effect on unicellular organisms. They noted a depression of all types of muscle—cardiac, striated, and non-striated. Pethidine also causes a non-toxic fall of blood pressure, depresses the respiratory centre, and acts as an analgesic by relieving spasm of smooth muscle and by raising the pain threshold. Gruber, Hart, and Gruber (1941) confirmed the fall in blood pressure, which they showed was due to preliminary vasodilatation. They found respiration temporarily diminished in depth and frequency, and that the effect on smooth muscle was unpredictable: no effect was noted on intact smooth muscle, contractions were maintained, and the analgesic effect was not due to spasmolysis. Generally, the effect on the uterus was one of stimulation, though to a less degree than with posterior pituitary extract. Rothschild (1941) stated that pethidine is a powerful analgesic with an action like that of morphine. It stimulates rather than depresses the central nervous system. No effect was observed on the pulse or the pupils, but the fall of blood pressure was noted and also depression of respiration, though only with large doses. Batterman (1943) confirmed the above findings and stated that pethidine is more valuable for relieving pain of visceral origin than that of peripheral origin. He noted a tendency towards dizziness and faintness, and doubted if the drug was safe for ambulatory patients. Syncope was occasionally seen. Batterman and Himmelsbach (1943) studied the effects of pethidine and compared them with those of morphine. They tested the analgesic effect by raising the pain threshold, using the method of Hardy, Wolff, and Goodell (1940). Batterman and Himmelsbach found that the pain threshold was raised to a maximum in one hour and that the effect lasted up to six hours. The usual duration of analgesia was about three hours. They found that 50 mg. of pethidine was equivalent to 22 mg. of codeine and to 17 mg. of morphine, but that the duration of its effect was shorter. They confirmed its value in visceral pain, especially in the colicky type, and quoted a personal communication from G. Woodby, who found no effect on the action of the uterus in labour. They considered the addiction liability less than that of morphine.

The question of the liability of pethidine to cause addiction was studied by Himmelsbach (1942), who stated that it was much less than with morphine. He observed tremor when pethidine was given over a long period. Andrews (1942a), using patients addicted to morphine, found that a tolerance is developed to the pain-threshold-raising effect that is maximal at eight weeks and is maintained for 30 days after discontinuance. Andrews (1942b) also found that morphine addiction causes changes in the electro-encephalogram and that pethidine in very large dosage has powerful cortical effects, which are pleasant and might lead to addiction. The doses given were enormous—in the region of 3,000 mg. Yonkman, Noth, and Hecht (1944) noted that pethidine is safe, is readily absorbed, and possesses a weak atropine-like action with a strong papaverine-like effect on smooth muscle. The effect was more intense in the presence of spasm or stimulation. Noth, Hecht, and Yonkman (1944) noted analgesic effects similar to those observed by Batterman and Himmelsbach (1943). They found a slight tendency to addiction.

Uses of Pethidine in Medicine, Surgery, and Gynaecology

Pethidine on account of its analgesic and spasmolytic effects has been used for relief of pain in medical, surgical, and gynaecological conditions. Christie (1943) gave pethidine by mouth to 335 cases, comparing its effect with that of tab. codein. co. He found that in 46% of cases pethidine was more effective than the codeine preparation, in 21% as effective, and in 33% it was ineffective. He found the analgesic effect less than that of morphine but generally enhanced when pethidine was given by injection. Branwood (1943) described clinical trials with pethidine, and concluded that it was valuable for biliary, renal, and intestinal colic and for hypertensive headaches. It was useless for neuritic pain. Sleep and drowsiness tended to occur independently of pain relief. A fall in blood pressure was noted, especially when pethidine was given intravenously, but no toxic effects were observed and no changes in blood or urine. FitzGerald and McArdle (1943) used pethidine in twelve neurological cases and found the effect comparable with or superior to that of morphine.

Objectionable side-effects such as giddiness, nausea, and faintness were noted when pethidine was given intravenously.

Rovenstein and Batterman (1943) described the use of pethidine with scopolamine for premedication. They found that patients tended to complain of thirst and dryness of the mouth. They noted, however, that this combination provides psychic sedation, does not depress respiration so much as morphine, facilitates induction of anaesthesia, has more effect in drying secretions than morphine, has fewer undesirable side-effects, and reduces the amount of anaesthesia required as much as morphine. Batterman and Mulholland (1943) studied the effect of pethidine as a substitute for morphine for post-operative pain. They found it satisfactory, though side-effects such as dizziness and nausea were noted. These might partly be due to the anaesthetic. The action was short—only about two hours. They prefer pethidine to morphine since it rarely causes respiratory depression, has an antispasmodic effect, dries mucous secretions, and does not suppress the cough reflex.

Sostmann (1940) used pethidine as a substitute for morphine in gynaecology. He found that the minimum effective dose was 25 mg. by mouth, 50 mg. by injection, and 100 mg. per rectum. He observed a good analgesic and spasmolytic effect. Hecht, Noth, and Yonkman (1943) studied the general effects of pethidine in 111 patients. They noted certain toxic effects, including dizziness, nausea, vomiting, dryness of the mouth, and euphoria. They found no effect with normal dosage on the blood or electroencephalogram, and concluded that pethidine can be used as a substitute for morphine. Hori and Gold (1944) reported a good effect from the use of pethidine in 2,000 cases, though this was weaker and of shorter duration than that of morphine. In post-operative cases there was less need for catheterization and the constipating effect was less than when morphine was used. Pethidine can be combined with scopolamine and with the barbiturates. In 50 obstetrical cases good sedation was obtained in 30, but the effect was better when pethidine was given with scopolamine.

Pethidine in Obstetrics

The first account of the use of pethidine in labour was that of Benthin (1940), who described its use in 400 cases. Pethidine was given alone in 250 cases and combined with amidopyrine in 150. The optimum dose was found to be 100 mg. given by intramuscular injection and repeated once or twice if necessary. The course of labour was uninfluenced and the child was not affected. The same author (Benthin, 1942) recommended an initial dose of 100 mg. combined with rectal administration. He claimed that pethidine reduced the duration of labour in 30- to 40-year-old primiparae to 13¼ hours. He found that pethidine could usefully be combined with oxytocics such as "thymophysin." Sonnek (1941) stated that labour was facilitated by the use of pethidine, and Fuchs (1941) claimed good results from the use of twilight sleep induced by pethidine and an intravenous barbiturate.

Gilbert and Dixon (1943) administered pethidine to 150 women in labour. The drug was given alone to 54 primiparae, the highest dose used being 650 mg. and the lowest 100 mg. The average total dose was 294 mg. The average time elapsing between the last dose of pethidine and the end of labour was 2 hours 42 minutes, and the average total length of labour 11 hours 18 minutes. In 62 primiparae pethidine was used in combination with "seconal" (sodium propyl-methyl-carbinyl allyl barbiturate). The average duration of labour and the length after the final dose were similar to those in cases where pethidine was given alone, and 72% of patients gained satisfactory analgesia with pethidine alone, though in no case was there amnesia. When pethidine was combined with "seconal" satisfactory amnesia could be obtained only with large doses—4½ gr. (0.29 g.) or more—of seconal. Toxic effects in the mother included dizziness and lightheadedness, also thirst and dryness of the mouth when a general anaesthetic was given as well. No effect on the third stage of labour was noted. Pethidine given alone had no apparent effect on the baby, but when combined with other methods, especially barbiturates, a slight to moderate depressant effect was noted, and treatment for foetal apnoea was necessary, though there were no foetal deaths from this cause. Gilbert and Dixon suggest as a programme for the conduct of labour that three 100-mg. doses should be given in the early stages and that the pethidine dosage should be completed early in labour. Amnesia may be added with other drugs when necessary.

Roby and Schumann (1943) presented a preliminary report of the use of pethidine combined with scopolamine in labour in 112 cases. They gave an initial dose of 100 mg. of pethidine, with 1/100 gr. (0.65 mg.) of scopolamine, followed by 1/100 gr. of scopolamine one hour later. Schumann (1944) gave a further report on 1,000 cases. These authors claim satisfactory amnesia in 70.5% and a shortening of labour by 2½ hours in primiparae and 1½ hours in multiparae. In patients expected to deliver themselves quickly, intravenous administration was used with no demonstrable ill effect, except for transient nausea. Of 37 patients delivered without anaesthesia 79% could recall no pain whatever. No demonstrable effect was noted on full-time or premature babies. Schumann claims that pethidine combined with scopolamine is superior as an obstetric analgesic to others in common use.

The following scheme of dosage is recommended. An initial dose of 100 mg. of pethidine and 1/100 gr. (0.65 mg.) of scopolamine is given. Forty-five minutes later a further 1/150 gr. (0.43 mg.) of scopolamine is given, and 100 mg. of pethidine with 1/200 gr. (0.32 mg.) of scopolamine four hours later. This is followed as required by 100 mg. of pethidine every four hours and 1/200 gr. of scopolamine every three hours. Mackenzie (1943) described two cases in which 50 mg. of pethidine hastened dilatation and relieved distress in the course of prolonged labour.

Gallen and Prescott (1944) described clinical studies in 150 cases. They gave 200 mg. of pethidine alone or in combination with scopolamine or with a bromide-chloral-and-opium mixture ("mother's mist."). They found that pethidine acts in 15 minutes and the effect lasts three to four hours. Amnesia was noted in only one case where morphine and scopolamine were also given. The duration of labour was apparently prolonged, but the forceps rate was 10%—not a significant increase. Toxic reactions included vomiting, rise of blood pressure, dizziness, vertigo, and dryness of the throat, but the pethidine was given by the intravenous route. Nine babies required resuscitation, and these authors doubt whether pethidine should be given within 2½ hours before delivery is expected.

Cripps, Hall, and Haultain (1944) in a report of 102 cases concluded that although pethidine is not the ideal obstetrical analgesic it fulfils many of the conditions required of such an agent. It is not always successful in producing analgesia, but no undue excitability was noted. Amnesia occurred only when hyoscine (scopolamine) was given as well. Pethidine was found useful for premedication for caesarean section under local analgesia in six cases. Spitzer (1944) described a series of 80 normal mothers in whom all but 10% received satisfactory relief

of pain in labour with pethidine. The oral route was used and doses of 50 mg. initially, followed by 25 mg., were given. No side-effects were observed. Spitzer claims, though without statistical evidence, that pethidine has a remarkable shortening effect on normal labour. Venters (1944) described a routine for labour where a bromide-and-chloral mixture was combined with diamorphine ("heroin"). Recently good results had been obtained by substituting pethidine for heroin, either entirely or in part.

Steinberg (1945), in describing 400 cases where pethidine and scopolamine had been used in labour, noted three cases in which oedema of the uvula occurred, one having oedema of the glottis as well. All three exhibited a cutaneous sensitivity to scopolamine, as did a fourth case in which oedema of the uvula occurred after the use of seconal and scopolamine. While not completely relevant to the discussion of pethidine in labour, this represents a complication of the use of scopolamine that might well prove dangerous.

Lull and Hingson (1945) describe pethidine as one of the safer drugs for obstetric analgesia, though they believe that depression of foetal respiration occurs comparable to that present in the mother. Less narcotization of the baby is seen than with morphine. They recommend the combination of pethidine with scopolamine or barbiturates.

It will be seen from the review of the uses of pethidine that it promises well as an obstetric analgesic, though it does not gain universal or unqualified approval. Its chief advantage seems to lie in its relative safety to mother and child and in the relative rarity of toxic effects. It certainly deserves extended trial, and the object of this paper is to present results in such a trial, to assess its scope and limitations in obstetrics, and to make recommendations for its use in the future.

Clinical Results

Pethidine was first used for obstetric cases in the Obstetric Unit at University College Hospital in 1942. In order to establish the safety of this then relatively new drug a preliminary trial was carried out in 47 cases using doses of 50 mg. No toxic effects were noted, but it seemed that this dosage was inadequate.

Between 1942 and 1946 a full trial was given in 500 labours. Pethidine was not administered to every patient in labour, but only to those who appeared to require a sedative or analgesic. These cases are thus to some extent selected, since patients who had easy and relatively painless labours did not receive pethidine. The dose used was 100 mg. given by subcutaneous or intramuscular injection, and repeated as required. In many cases pethidine was combined with other sedatives and analgesics, patients receiving nitrous-oxide-and-air analgesia or "trilene" in the later stages of labour. In a few cases where pethidine appeared to be insufficient, morphine or papaveretum ("omnopon") was given later in labour. No case received hyoscine since it was desired to ascertain as far as possible the effects of pethidine alone.

This series of 500 cases included eight pairs of twins, so that 500 mothers gave birth to 508 infants. There were 479 primigravidae and 21 multiparae. The total dosage given was as follows:

344 mothers received 100 mg.	9 mothers received 400 mg.
124 " " 200 "	2 " " 500 "
1 mother " 250 "	1 mother " 600 "
19 mothers " 300 "	

A single injection of 100 mg. was adequate for the majority of labours, and a high proportion of the remainder required only two doses. Table I shows the method of delivery in these 500 cases.

TABLE I.—*Method of Delivery*

	Primigravidae	Multiparae
Spontaneous, vertex presentation ..	415	20
Forceps	46	0
Breech presentation	8	0
Face presentation	3	0
Twins	7	1
Total	479	21

There was no maternal mortality. Slight toxic effects were noted in eleven mothers. These included dizziness, a feeling of faintness, giddiness, or numbness, sweating, and slight retching. One mother stated that the injection made her feel "fighting mad." These effects were transient.

Of the 508 babies 21 were lost: 8 were stillborn and 8 macerated—a stillbirth rate of 16 (3.2%)—and there were 5 (1%) neonatal deaths, making a total loss of infant life of 4.2%. Of the 8 stillbirths, two followed forceps delivery, two breech delivery, two were found to have atelectasis at necropsy, but both had died *in utero* before pethidine was given. One infant had a bilocular heart and the eighth was a premature twin weighing only 2 lb. 6 oz. (1.1 kg.). Five of the macerated infants died in labour for no apparent cause, and the remaining three consisted of one pair of twins and a premature twin infant. Two of the neonatal deaths were due to gross deformity, one to asphyxia following forceps delivery, one to prematurity, and one to white asphyxia following a very long labour. It was not felt that the administration of pethidine contributed in any way to the infant deaths.

Signs of asphyxia at birth were noted in 55 infants. Of these, 13 were born in a state of white asphyxia or shock, but in all except one there was a definite cause such as operative delivery. Of the rest, the type of asphyxia was not stated in three cases, and in 39 the infant was slightly blue at birth or slow to breathe.

The mean time elapsing between the last dose of pethidine and delivery in the 500 cases was 6.74 hours. It was found, however, that 143 mothers were delivered less than three hours after the last dose, 51 three to four hours after the last dose, and 56 four to five hours after the last dose. In the cases of the mothers of the 55 babies suffering from asphyxia it was found that 13 were delivered less than three hours after the last dose, 4 three to four hours after, and 2 four to five hours after. In view of these findings it seems doubtful if pethidine contributed to foetal asphyxia to any serious extent, though in a few cases it may have caused slight respiratory depression.

The effect of pethidine on the mother in labour was studied in the following ways. Those responsible for the conduct of labour were asked to observe and report the analgesic and amnesic effects of pethidine, and, in addition, patients were asked, either shortly after delivery or on the following day, to express an opinion on the relief of pain and the sedative effect given by the injections. Satisfactory answers were not obtained in all cases, since the memory of labour is often blurred by natural amnesia or by the effect of other analgesics such as nitrous oxide or trilene or by a general anaesthetic given for instrumental delivery. The results are summarized in Tables II, III, and IV under the headings analgesia, amnesia, and patients' opinion.

TABLE II.—*Analgesic Effect of Pethidine in Labour*

Complete analgesia	26
Good analgesia	208
Slight relief of pain	84
No relief	110
Not stated	72
Total ..	500

Thus out of 428 patients satisfactory analgesia was obtained in 234 (55%). Some analgesia was obtained in 318, or 74% of these 428 cases. In many of the cases in which there was no relief the injection was given much too late in labour—towards the end of the first stage, when it was found that pethidine was often ineffective and that inhalational analgesia as by nitrous oxide and trilene was to be preferred.

TABLE III.—*Amnesic Effect of Pethidine in Labour*

Good or complete amnesia	21
Slight amnesia	13
No amnesia	304
Not stated	162
Total	500

Thus out of 338 patients only 34 (10%) obtained any amnesic effect. This confirms the findings by others that pethidine has little such action when given alone. If amnesia is required, some other drug such as hyoscine must be added.

TABLE IV.—*Patients' Opinion of Pethidine in Labour*

Very enthusiastic, complete relief of all symptoms	30
Good relief of pain	103
Slight relief of pain	18
Slept after injections	126
Able to rest well after injections	96
Able to relax after injections	35
Relieved nervousness	2
Appeared to hasten labour	5
Doubtful	23
No effect	62
Total	500

These results were summed up under the above heading as representing most adequately the statements made by patients when questioned regarding the effects of pethidine. The answers appear to fall into two main groups—those who claimed relief of pain and those who experienced a sedative effect, permitting sleep in many, and in others inducing a feeling of restfulness and relaxation. Out of the 477 patients who gave satisfactory answers, 415 (87%) had had some relief of symptoms following the administration of pethidine. Several patients stated that they found the effect of pethidine of short duration.

The effect of pethidine on the course of labour was studied by noting the action of the injection on the uterine contractions. No effect was noted in 334 cases, or 67%. In 118 (23.3%) the strength of the contractions seemed to be increased and the course of labour hastened, while in 44 (8.8%) the contractions appeared to diminish in strength. No record was available in four cases.

It has been claimed that pethidine reduces the duration of labour, and it was decided to investigate this point by determining the length of labour in this series and in a control series in which no pethidine was given. For control purposes the duration of labour in primigravidae delivered in the Obstetric Hospital, University College Hospital, in the year 1939 was estimated. This year was chosen because 1940 and 1941 were abnormal years, and pethidine has been consistently in use in the hospital since 1942. The results are given in Table V, which shows the mean duration of

TABLE V.—*Effect of Pethidine on the Duration of Labour in Primigravidae*

	Total	1st Stage (hrs.)		2nd Stage (mins.)		3rd Stage (mins.)	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Pethidine	476	29·5	22·0	118·1	117·0	31·2	27·1
Controls	619	22·2	21·2	113·3	90·5	27·0	34·5
Difference		7·3		4·8		4·2	
Standard error of difference		1·3		6·5		1·9	

the first, second, and third stages of labour in 476 out of the 479 primigravidae who received pethidine compared with those in 619 primigravidae delivered in the hospital in 1939.

It will be seen that the patients who received pethidine had a significantly longer first stage than the controls, while there is an apparent prolongation of the second stage which is not significant and is of less than five minutes. The difference in the duration of the third stage is also slight and barely statistically significant. It is fully realized that the pethidine cases were specially selected on account of distress in labour, and form only a portion of the patients delivered in the hospital between 1942 and 1946, so that this is by no means an adequately controlled series. Ideally, of course, for the purpose of such a series, pethidine should be given to alternate primigravidae in labour, but there are many practical difficulties in the way of such an experiment, including the fact that not infrequently patients arrive in the hospital very late in the course of labour and often in the second stage. These results do not, however, support the claims that pethidine reduces the duration of labour.

Forceps delivery was performed in 46 out of the 500 patients who received pethidine in labour. This gives a forceps rate of 9.2%. During the year 1939, 927 patients were delivered in the hospital, 22 by caesarean section. Of the 905 patients delivered per vaginam forceps delivery was performed in 71—a forceps rate of 7.8%. The difference between the two groups is not statistically significant, and in any event the higher proportion of primigravidae in the cases receiving pethidine probably accounts for the slightly higher rate of forceps delivery.

Post-partum haemorrhage—a loss of blood exceeding 20 fl. oz. (568 ml.) after the birth of the baby—was noted in 16 of the 500 cases receiving pethidine. In six cases haemorrhage followed forceps delivery, in one case extraction of the breech was performed under anaesthesia, and there was one case of twins. No cause was apparent in the remaining eight cases. This low incidence suggests that pethidine given in labour does not in any way cause an increased tendency to haemorrhage in the third stage.

As was stated earlier, many of the patients in this series received some other analgesic or sedative in addition to pethidine. It was found that pethidine could be effectively combined with chloral hydrate, 2 fl. dr. (7 ml.) (22 gr. (1.5 g.) of chloral hydrate) being given by mouth 20 minutes after the injection of pethidine. For the later part of the first stage and for the second stage, nitrous oxide or trilene analgesia was given in many instances. For forceps delivery general anaesthesia was always used.

Pethidine as Premedication for Caesarean Section

Because pethidine appears to produce little or no depression of the foetal respiratory system, even when given shortly before delivery, it has been used for premedication in cases of caesarean section. Records of 32 operations are available for the present series. Pethidine was given in combination with atropine gr. 1/100 (0.65 mg.), four patients receiving 100 mg., 27 receiving 200 mg., and one, to whom 500 mg. of pethidine had previously been given in labour, a total of 600 mg. There was no maternal or foetal mortality. Slight asphyxia was noted in 10 infants, but in eight delivery had been performed under general anaesthesia. In one case epidural analgesia combined with nitrous oxide was used, while delivery in another was accomplished with local analgesia. In this last case there was a slight depression of respiration, but recovery was rapid.

General anaesthesia was employed in 17 cases. Epidural analgesia was used alone in six cases and supplemented by nitrous oxide and oxygen in seven. One patient was delivered under local analgesia and one under local analgesia supplemented by cyclopropane. The high proportion

of cases of epidural analgesia is accounted for by the fact that this method was under trial in the hospital while the investigation of pethidine was taking place. Six of the infants were premature, weighing from 3 lb. 1 oz. (1.4 kg.) to 5 lb. 8 oz. (2.5 kg.). In none was there any sign of asphyxia.

This small series is included because it gives evidence regarding the effect of pethidine on the infant. In almost every case the second dose of 100 mg. of pethidine was given well within an hour preceding the operation. In only one case could any effect on the foetal respiratory system from pethidine alone be noted, and this was slight and transient. In the cases receiving general anaesthesia it is difficult to assign responsibility for foetal asphyxia. The effect on the mother is not easy to assess, especially as so many received general anaesthesia. The impression was gained that a more useful effect would be obtained by combining pethidine with hyoscine as premedication for caesarean section, though a series of cases would be necessary to prove the safety of this.

Conclusions

Six criteria for the ideal method of relieving pain in labour were laid down by Sturrock (1939). As a result of the experience in 500 cases it is now proposed to attempt to assess how far pethidine fulfils his conditions.

1. "That it does not endanger the life of the mother or child or in any way have an adverse effect upon them."—Pethidine appears to satisfy the first part of this criterion. In the present series there was no maternal mortality. The foetal mortality was low and in no case could foetal death be attributed to pethidine. Toxic effects noted in the mother were slight and transient, amounting to little more than dizziness or a feeling of faintness. It has been stated that pethidine has a slight but definite depressant effect on the foetal respiratory system. In the present series pethidine may have accounted for a few of the cases of slight asphyxia or of slowness in achieving normal respiration. The condition was never severe enough to cause anxiety and recovery was always rapid.

2. "That it abolishes or diminishes pain and the memory of suffering over long periods."—Good analgesia was obtained in the present series in 55% of cases, while 74% of patients obtained some relief of pain. In some of the cases where pethidine failed to procure analgesia it is suggested that the injection may have been given too late in labour. In addition, a definite sedative effect was claimed by a large number of patients, so that 87% experienced relief of symptoms in some form. It does seem possible that there is some personal idiosyncrasy to pethidine. This is noted when pethidine is given in medical, surgical, and gynaecological cases, some patients obtaining marked relief while in others there is little or none. Pethidine has little or no amnesic effect, and if amnesia is required in labour it is suggested that hyoscine be given in addition, though it is doubtful whether complete amnesia is either essential or desirable in every labour. Sturrock's second criterion is thus only partly fulfilled by pethidine.

3. "That it does not diminish uterine contractions and thereby delay labour or predispose to atonic post-partum haemorrhage."—In 67% of cases no effect was noted on uterine contractions. in 23.3% the contractions appeared to increase, and in 8.8% there seemed to be a slight diminution. The first stage of labour lasted longer in the primigravidae receiving pethidine that in a control series of primigravidae delivered in 1939; but there is a probable fallacy in this observation, since the cases receiving pethidine were selected on account of difficulty or distress in labour. No tendency to post-partum haemorrhage was noted.

4. "That during the second stage it does not prevent the patient from co-operating intelligently with the doctor, so that an antiseptic and aseptic technique can be maintained."—This condition is amply fulfilled when pethidine alone is used, as the slight effects of pethidine on the patient do not prevent co-operation.

5. "That there is no necessity for operative delivery solely on account of the method used to alleviate pain."—This condition is also fulfilled, since there was no evidence of an increase in the number of patients requiring forceps delivery after pethidine.

6. "That it is simple to give."—This criterion is easily fulfilled, as a single injection of 100 mg. of pethidine appears to suffice for the majority of labours, though some require a second injection and a few three or more. The method of administration, however, presents no practical difficulties.

It may be concluded that pethidine approaches the criteria for an ideal analgesic for use in labour more nearly than any other known substance. Its chief advantages are safety, lack of toxic effects, lack of effect on the course of labour, and simplicity of administration. It may also usefully be combined with other agents. Hyoscine has not been employed in this series, but reports of its use in combination with pethidine are encouraging. It would seem to give the advantage of amnesia, but with the possible disadvantage of lack of co-operation of the patient in the later stages of labour and thus of a possible increased need for instrumental delivery.

It is not suggested that pethidine is necessary in every labour. It is well known that many labours are relatively painless and that much can be done for the patient by encouragement, allaying nervousness, and by the practice of relaxation. These facts are well known and everything must be done to apply them. There are still many cases in which there is real distress. Pethidine helps such patients by allaying suffering and by inducing sleep or restfulness. It is suggested that 100 mg. of pethidine be given by injection as soon as the uterine contractions are causing distress. This dose may be repeated in one hour if necessary and thereafter as required. Chloral hydrate given in addition has appeared to enhance the effect. For the later stages inhalational analgesia in the form of nitrous oxide and air or oxygen or trilene may be used if necessary. This combination will give relief in the majority of cases and is simple and safe.

Summary

The results of the administration of pethidine in labour to 500 patients—479 primigravidae and 21 multiparae—are given.

There was no maternal mortality. Eleven mothers noted slight toxic symptoms.

The foetal mortality was 16 stillbirths (3.2%) and 5 neonatal deaths (1%). Signs of asphyxia were noted in 55 infants; recovery occurred in all. Pethidine may have contributed to slight respiratory depression in a few cases.

Good analgesia was experienced by 55% of mothers. Failures may be accounted for in some cases by the fact that pethidine was given too late in labour. Amnesia was obtained in only 10%. Pethidine given alone does not appear to lead to amnesia.

Some relief of symptoms, chiefly in the form of analgesia or of sleep, and a feeling of restfulness and relaxation were experienced by 87% of the patients.

No effect on uterine contractions was noted in 67%. In 23.3% contractions appeared to increase, while in 8.7% they appeared to diminish.

The duration of labour was compared in primigravidae with a control series of patients delivered in 1939. It was found that the first stage was seven hours longer in patients receiving pethidine. This may be due to other factors, but the claim that pethidine shortens the duration of labour cannot be substantiated.

The forceps rate was 9.2%, comparing favourably with a rate of 7.8% for the year 1939, since the series receiving pethidine contained a high proportion of primigravidae.

No tendency to post-partum haemorrhage was noted.

Pethidine was used for premedication for caesarean section in 32 cases. There was no maternal or foetal mortality.

As a result of this investigation pethidine is compared as an obstetric analgesic with the ideal criteria laid down for such an

agent by Sturrock (1939). Although pethidine does not fulfil all his criteria it is suggested that it approaches the ideal more nearly than any other obstetric analgesic drug in current use.

Brief recommendations for the use of pethidine in labour are given.

My warmest thanks are due to Prof. F. J. Browne, under whose aegis as Director of the Obstetric Unit at University College Hospital this work was carried out; also to his successor, Prof. W. C. W. Nixon, for valuable help with the manuscript.

I am indebted to Roche Products, Limited, for supplies of pethidine used in the early part of this investigation. My thanks are also due to Miss Monica Cogman for help with the statistical work and to Sister Billing and the staff of the labour wards in the Obstetric Hospital, University College Hospital, whose willing co-operation made this investigation possible.

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The scientists on the whaling factory ship *Balaena*, in the Antarctic, have been investigating for the Department of Scientific and Industrial Research methods of ensuring that whale meat is in the freshest possible condition when frozen. There are certain general principles of slaughtering of animals for meat and the handling of carcasses which can be followed only with difficulty in whaling. One of the most important of these is rapid cooling of the carcass immediately after death. Owing to the bulk of the whale's carcass and the thickness of the blubber cooling takes place very slowly, and the meat is therefore likely to go bad rapidly. As the time between death and butchering on the deck of the factory ship may vary considerably, some method of cooling the carcass as soon as possible after death had to be found. An experiment was recently carried out to test a method of doing this. The carcass of a whale when caught is normally inflated with air to prevent its sinking. This causes the whale to roll over on to its back and float belly uppermost. In the experiment portions of the skin and blubber were removed as soon as possible after death to admit cold sea water, which at that time was at a temperature of 30° F. (−1° C.). It was necessary to insert a special temperature-recording unit deep into the body before this to register the temperature immediately after death and any subsequent change. The leader of the scientific team, Dr. R. A. M. Case, therefore entered the water as the whale surfaced after its final dive. Clad in a frog-man diving suit he swam under the belly of the whale and shot his recording thermometer into it. It was found that when the blubber was stripped from the belly the internal temperature of the whale fell rapidly.

AN OUTBREAK OF STAPHYLOCOCCAL FOOD-POISONING

BY

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AND

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Since 1930 many outbreaks of food-poisoning have been described in which the evidence has pointed to a staphylococcus as the responsible organism. Commonly, milk and milk products have been the vehicle, but other foods, such as prepared meats, have less often been the medium in which the toxic substance was disseminated. The actual time and place when contamination of the food occurred have been difficult to define, and conclusions have been made on circumstantial evidence. Early last year Williams *et al.* (1946) described three outbreaks of staphylococcal food-poisoning due to ice-cream, in two of which, by typing the isolated staphylococci with bacteriophage, they were able to trace the source of contamination to an assistant in the cookhouse where the ice-cream was prepared.

The present article describes an outbreak of staphylococcal food-poisoning due to consumption of pressed pickled beef in which the source of infection was demonstrated by means of bacteriophage typing.

The Outbreak

On Sept. 27, 1946, 167 miners at several collieries were taken ill three hours after eating sandwiches containing pressed pickled beef. The outbreak was explosive, and clinically the onset was sudden, with dizziness, nausea, vomiting, diarrhoea, and pain in the abdomen. All the patients were much better in 24 hours and were normal in about three days. Fifteen men were sent to hospital with severe prostration, but were not detained longer than 24 hours.

This outbreak had been preceded by two smaller ones, on Aug. 16 and 30, involving 16 and 22 men respectively, pressed beef sandwiches being the suspected food. On the first occasion the cause was not established. On the second occasion a staphylococcus was isolated from the pressed pickled beef but not from the vomit. All the meat came from one cooking centre, but in the second outbreak this was not obvious, because the sandwiches had on this occasion been made up elsewhere. Immediately the third outbreak occurred steps were taken to investigate the matter in detail.

The Food.—At the centre from which the pressed beef was distributed the meat was cooked, pickled, and pressed by one butcher, who placed it, when ready for cutting, in a large refrigerator of the domestic type, operating at a temperature just above freezing point. The quality of the food and the conditions during preparation were quite satisfactory. The pressed beef was made into sandwiches on the day of distribution to the collieries. One pressed beef sandwich was wrapped in grease-proof paper along with another containing either roast beef or corned beef. The whole packet was known as a "B" pack, and had stamped on it a date after which the pack should not be eaten (this prevented the sale of stale sandwiches). These "B" packs arrived at the various collieries between 9 a.m. and 1 p.m. on the day of distribution, and were issued to the afternoon shifts at 2 p.m., to the night shifts at 10 p.m., and to the day shifts at 6 o'clock the following morning.

They were eaten about five hours after the miners received them. On the occasion of the outbreak under discussion 1,661 "B" packs were sold among 10,098 miners. The afternoon and night shifts, totalling 1,713 persons, to whom 189 "B" packs were sold, apparently did not suffer any ill effects. All the 167 victims were members of the day shifts, numbering 8,385 men, to whom 1,472 "B" packs were sold. It was not possible to ascertain how many "B" packs each man consumed. Storage conditions varied from colliery to colliery, some having refrigeration, but others having to keep the packs at room temperature—at that time about 74° F. (23.3° C.).

Bacteriology

Staphylococcus pyogenes aureus was isolated from the vomit of three individual patients by plating, via Robertson's meat medium, and also, by direct plating on blood agar, from a vessel into which several miners had vomited. It was also isolated from some "B" packs remaining at one of the collieries, as well as from "B" packs belonging to the suspected batch that had not been distributed; and was recovered from the outer surface of a block of uncut pressed beef in a refrigerator at the cooking centre. We failed to isolate it from the brine in which the pressed beef was prepared, from the bench on which the sandwiches were cut, and from the bread-slicing machine. Petri dishes of nutrient agar exposed in the centre did not grow a *Staph. pyogenes.*

Kelly and Dack (1936) have shown that staphylococci will grow in meat with a content of 10% sodium chloride, which prohibited the increase of spore-forming and non-spore-forming rods; this is in accord with our experience, for after 18 hours' incubation the blood-agar plates, after direct plating and plating via Robertson's meat medium, gave a preponderant growth of staphylococci, although a spreading organism finally outgrew the cocci on the plates after three to four days.

A search for carriers was made among the staff at the cooking centre. Swabs were taken from the nose, throat, and any lesions in exposed parts of the body likely to be a source of contamination to the food. In all, 58 swabs were examined from 28 persons, and the results are shown in Table I. The 10 positive swabs came from eight people, and the distribution is shown in Table II.

TABLE I.—*Staph. pyogenes aureus Found in Swabs from Personnel*

No. of Persons	No. of Swabs	No. of Positive Swabs	Site of Positive Swabs		
			Nose	Throat	Hands
28	58	10	6	2	2

TABLE II.—*Distribution of Positive Swabs*

No. of Positive Swabs	Total No. of People	Nose Only	Throat Only	Nose and Hand	Throat and Hand
10	8	5	1	1	1

All the coagulase-positive staphylococci from whatever source were of *aureus* type, fermented mannite, liquefied gelatin, and were haemolytic on horse-blood-agar plates. They were all submitted to the central laboratory of the Public Health Laboratory Service for bacteriophage typing. Staphylococci belonging to the same bacteriophage type (47/47C) were shown to have been present in the vomit (individual and pooled), "B" packs, pressed beef, and the nose and on the hand of the butcher who prepared the pressed beef. Neither *Staph. pyogenes* nor organisms of the *Salmonella* and dysentery groups were isolated from faecal samples submitted from seven patients.

Discussion

An explosive outbreak of gastro-enteritis involving 167 persons two to four hours after they had eaten pressed pickled beef sandwiches suggested the probability of toxic origin. Two independent lines of inquiry led to the source of the trouble. One investigation, by the local and county medical officers of health and their staff, by elimination, led through the common denominator of the pressed beef as a vehicle to the butcher who was the sole person handling the beef in all three outbreaks. In the second outbreak, although the sandwiches had been prepared at another centre, the beef was processed by this butcher. The other line of inquiry, consisting of the chemical and bacteriological analysis of the food and material involved in pickling the beef, showed that inorganic substances capable of toxic effects were absent or were present in normal quantities—for example, nitrites, arsenic, zinc, antimony, lead, mercury, copper, and tin—while *Staph. pyogenes aureus* was isolated from an uncut block of pressed beef and the sandwiches. It had also been isolated from the vomit of individual cases and a communal bucket, as well as from eight of the workers in the food-preparing centre. This evidence was reinforced by bacteriophage typing.

The same bacteriophage type was found in the pressed beef block, the pressed beef sandwiches, the various vomits, and on the person of only one worker in the food-preparing centre—the butcher who was responsible for pickling and cooking the meat and who handled it from the raw state to the finished pressed block ready for slicing. He was harbouring the organism in his throat and in a trivial cut on the palmar surface of his right hand, and it seems most likely that from this second source the contamination of the pressed beef occurred. The cut could easily have been overlooked, and was causing the butcher no discomfort, although the swab revealed a heavy growth of the offending staphylococcus. It was the sort of minor lesion that would have been treated lightly by anyone. The general hygiene of the centre was excellent—floors and benches were clean and the workers wore clean caps and overalls.

It is of great interest that all the cases occurred among the day shifts. The sandwiches were made during the earlier part of the day of distribution, and by the time they were eaten by the afternoon shifts were about eight hours old, by the night shifts 17 hours old, and by the day shifts about 25 hours old. No complaints occurred among the afternoon and night shifts, and it therefore seems that, under conditions prevailing in the sandwiches, it took the organism between 17 and 25 hours to produce enough toxin to cause sickness. Experimental confirmation of this is difficult because the only satisfactory indication of the presence of enterotoxin is the reaction of a human volunteer. The kitten test as described by Dolman and his collaborators (1936) has not been found completely reliable by Fulton (1943). However, under almost identical conditions of temperature and material (five hours' incubation at 37° C., followed by 16 hours' refrigeration and a further six hours' incubation of a pressed pickled beef sandwich) Kelly and Dack (1936), using human volunteers, showed that no ill effects were observed on eating the sandwiches after the first 5 hours' incubation, but that the typical symptoms of staphylococcus enterotoxin poisoning followed the ingestion of the sandwiches at the end of 26 hours. Incidentally they noted that under identical conditions one volunteer showed no ill effects, while another was severely ill. It would appear also that the organisms are capable of producing the enterotoxin under a wide temperature range, because at the collieries storage conditions varied from 35° to 74° F. (1.7° to 23.3° C.), and yet cases occurred

at each of them and no correlation between the storage temperature and the number of cases could be made out.

The butcher who was the source of the staphylococcus causing the outbreak had local treatment for the lesion in his hand, which soon healed. He also had a course of sulphathiazole, and swabs from his nose, throat, and hand are now negative.

This experience has shown the value and importance in such outbreaks of close liaison between all interested parties and the necessity for thorough and prompt investigation by a bacteriologist with up-to-date services at his disposal.

Summary

An outbreak of toxic food-poisoning following the consumption of pressed pickled beef sandwiches is described. The evidence showed *Staph. pyogenes aureus* (phage type 47/47C) to be the cause. Personnel handling food should pay scrupulous attention to personal hygiene and especially to lesions, however slight.

Close liaison between all interested parties was an important factor in finding the cause.

Our thanks are due to Drs. Hall, Brothwood, and Carroll and the staff of the Lancashire County Council Public Health Department, especially Mr. Eckersley and Mr. Ward, for providing many of the circumstantial details. We also wish to thank Prof. H. B. Maitland for his criticism and advice.

Drs. Allison and Williams, of the P.H.L.S. Central Laboratory at Colindale, kindly phage-typed the staphylococci for us, and Mr. C. H. Walker, analyst to the Lancashire County Council, performed the chemical analyses.

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d-TUBOCURARINE IN CAESAREAN SECTION

BY

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Anaesthesia for caesarean section is a subject full of controversy, but the advent of *d*-tubocurarine seems to offer a solution to some of its problems. It assures an easy induction and eliminates any necessity for harmful doses of toxic anaesthetic agents. This report on a series of 30 such operations in which this drug has been used is published in the hope that it will encourage others, who may have greater opportunities in this field of anaesthesia, to explore its possibilities. It is hoped that the constancy in results may convince despite the paucity in numbers.

Technique

The best results were obtained with the following technique and dosages. As premedication, 1/100 gr. (0.65 mg.) of atropine is given one hour before operation. When the surgeon is scrubbed up and ready, the induction is carried out on the table with an injection of 15 mg. of *d*-tubocurarine ("tubarine"—Burroughs Wellcome and Co.) followed by 0.3 g. of "kemithal" (cyclohexenyl-allyl-thiobarbiturate) in 5% solution. Anaesthesia is maintained with cyclopropane, using the closed circuit. The loss of consciousness which results from the initial injection is, however, only transient, and it is necessary that the face-piece of the anaesthetic apparatus be applied without delay. Respiration is "aided" (Gray and Halton, 1946) from the beginning, for it is of paramount importance that the small amount of depression that may result from this dose of *d*-tubocurarine must not be allowed to result in any suboxygenation.

The operation is started as soon as the patient fails to respond to painful stimuli. An early indication as to when this plane has been reached may be afforded by the reaction of the patient to the application of the towel clips. Up to the time of delivery of the child the anaesthesia must be kept as light as possible. It has been found useful to turn the absorption canister out of the circuit for a few minutes before the uterus is incised. In such a short time this has probably little effect upon the mother, but may build up a carbon dioxide tension in the foetal blood which may well contribute to the early commencement of respiration by the baby. After delivery the anaesthesia is deepened as required, but it is not necessary to carry it lower than deep first plane. A pharyngeal airway is not usually inserted. In fact it is inadvisable, as this procedure may well precipitate vomiting. Endotracheal tubes and a laryngoscope are always to hand, but have been found necessary only on the one occasion described later.

Results

There has been a certain dependability about the results of this technique which has been encouraging. There is no anxiety with regard to depression of the infant. With the exception of two understandable cases these babies have all cried most lustily as soon as the head was delivered. They have been quite unusually lively and have shown no evidence of curarization. One of the exceptions was an infant who was rather sleepy but cried after five minutes. In this case thiopentone, 0.15 g., was used for induction instead of the usual "kemithal." The other was a premature baby of 32 weeks weighing 3 lb. 2 oz. (1.42 kg.), and the mother was eclamptic, having had several fits before delivery. This baby took six minutes to expand its lungs.

An increased contractility of the uterine muscle has been observed. The placenta always separates very easily and the uterus contracts down firmly. The injection of "pituitrin" (pituitary lobe extract) which had always been routine was continued in the early cases before this feature was appreciated. It was seen to be unnecessary and has been abandoned. Five patients who it was felt might be predisposed to post-partum haemorrhage received 0.5 ml. of pituitrin. The usual indication for this was a justifiable apprehension on the part of the surgeon rather than any unsatisfactory condition of the uterus. Nineteen patients who had no uterine stimulant showed excellent contraction throughout, and not infrequently clots have been observed extruding through the cervix at the end of operation.

As a result of the extremely light anaesthesia the patient wakes up as the dressings are applied, and she often has been told the all-important news before she leaves the theatre. On occasion there have been slight residual signs of curarization at the end of an unusually quick operation, but only twice has it been necessary to inject adequate doses of "prostigmin" and atropine. This has always resulted in complete recovery.

Post-operative vomiting or retching is rare, and is only minimal when it does occur. One of the patients under review developed a chest complication, but it was of doubtful nature and had completely cleared up within 48 hours. There was no evidence of any undue retention of urine; nor have any eye symptoms as reported by Langton Hewer (1946) been seen. There has been no case of ileus.

Discussion

The ideal anaesthesia for this operation should be safe and, if possible, pleasant. It must provide good working

conditions for the surgeon and be non-depressing to the baby and the uterine tone. The safest technique to date has probably been local analgesia, but there are few who would care to maintain that this is a pleasant experience. Some of these patients who had undergone previous sections have been most grateful for the intravenous induction and the subsequent freedom from unpleasant sequelae.

d-Tubocurarine has passed its experimental stage, and its early promise has been confirmed by further extensive experience. It is debatable whether any potent drug which is delivered into the blood stream can be called safe, but this one seems to be less dangerous than many others in daily use. On the other hand, among these patients were five who were seriously ill: two had eclampsia, having had several fits, two had had extensive haemorrhage from placenta praevia, and one had advanced pulmonary tuberculosis. They all had an uneventful convalescence and with the exception of the last mentioned were fit for discharge within three weeks.

Vomiting during the induction of anaesthesia with consequent aspiration pneumonia is acknowledged to be one of the hazards of this procedure. These patients have not had the usual sedative preparation. They are often admitted as emergencies "off the district," and are not infrequently stout and short-necked. All these factors tend to make the induction period a rather anxious time. The ill-advised insertion of an airway immediately after the initial injection did precipitate vomiting in one instance. A cuffed endotracheal tube was inserted, and the fact that suction was ready and to hand prevented any untoward result. Whatever the anaesthetic, these patients are very likely to vomit if they have had a recent meal. A rapid intravenous induction makes the emergency less likely, and the administration of *d*-tubocurarine undoubtedly facilitates the intubation which may be required as either a prophylactic or a therapeutic measure.

The freedom from curarization of the baby has not been surprising. Whitacre and Fisher (1945) have reported that "intocostrin" (Squibbs's biologically standardized extract of curare) has no effect on the infant—an observation which has been confirmed in the present series. Substitution of "kemithal" for thiopentone as an inducing agent and the small amount of anaesthetic which is required after *d*-tubocurarine are factors which have contributed to the wide-awake condition of these babies.

The good uterine tone that has been so marked a feature was not expected. This has been so striking that on two occasions it caused a temporary embarrassment to the surgeon, who found that his hand was being gripped by the contracting uterus as he extracted the child. This has so far not proved a serious handicap, and the otherwise good operating conditions have been ample compensation.

Finally, this technique, by avoiding long post-operative depression, which is especially menacing after this operation, undoubtedly contributes to a peaceful and trouble-free convalescence.

Summary

A technique for anaesthetizing patients undergoing caesarean operations using *d*-tubocurarine, "kemithal" and cyclopropane is reported. It has been used in 30 cases and the results are reviewed.

My grateful thanks are due to Mr. Percy Malpas and the other members of the obstetrical team at Whiston County Hospital for their help and confident co-operation.

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USE OF *d*-TUBOCURARINE CHLORIDE AND THIOPENTONE IN ELECTRO-CONVULSION THERAPY

BY

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Convulsion therapy for the treatment of psychiatric disorders was introduced in 1934 by Meduna, who injected convulsant drugs intravenously. The treatment, however, was so unpleasant that patients were unwilling to continue with it; the considerable rise in blood pressure that occurred rendered it unsuitable for cardiac and arteriosclerotic patients, and fractures and dislocations were very common. The introduction of electrical convulsion therapy (E.C.T.) (Cerletti and Bini, 1938) diminished the frequency of traumatic complications; but this form of therapy was still unpleasant for the patient, and the rise in blood pressure resulted in cardiovascular accidents which were sometimes fatal. Twenty deaths attributed to E.C.T. have been reported, and 16 of these were either definitely or probably due to cardiac failure (Feldman *et al.*, 1946). By the use of E.C.T. with hyperextension of the spine and mechanical restraint the incidence of compression fractures of the spine has been reduced to about 4% (Cook, 1944), although occasional fractures cannot be prevented. The use of spinal anaesthesia, which has recently been introduced to soften convulsions (Shorvon and Shorvon, 1943), is very limited, as it does not prevent fractures of the arms or jaw, it cannot be used in patients with high or low blood pressure, and it carries with it all the hazards of spinal puncture. Although Bennett (1940) was the first to report on the use of curare for softening convulsions in shock therapy, *d*-tubocurarine chloride, an alkaloid obtained from crude curare, was used at Woodside Hospital for a considerable time before the publication of this paper. Unfortunately the work was interrupted by the war and was not followed up (Palmer, 1939, 1946). Since 1940 many American workers have confirmed Bennett's observations without, however, modifying his technique.

Curare-like drugs minimize convulsions by paralysing voluntary muscle. They do this by blocking the nerve impulse at the myoneural junction, probably by preventing the effector substance in the muscle from reacting to acetylcholine. In the doses in which it is used clinically *d*-tubocurarine chloride acts almost exclusively on voluntary muscle and produces few side effects if oxygenation is adequate. A slight fall in blood pressure may occur immediately after its intravenous injection, followed by a slight rise. It has no significant effect on the human electrocardiogram (Gray and Halton, 1946; Prescott *et al.*, 1946). A slight overdose can, however, seriously depress respiration by paralysing the diaphragm, and both bronchospasm and laryngeal spasm have occurred following its use without an anaesthetic (B. G. B. Lucas, personal communication).

Preliminary Investigations

American workers report that combined curare and convulsion therapy is dreaded less by the patient than

convulsion therapy alone, but our experience is directly contrary to this. In our early experiments all patients complained bitterly of the terrifying feeling of suffocation and extreme weakness after an injection of *d*-tubocurarine chloride, and some refused further treatment. We first attempted to relieve the unpleasant symptoms by producing unconsciousness with a preliminary subconvulsive electric shock immediately after the injection of the *d*-tubocurarine chloride. It was found impossible, however, to gauge the dose to such a nicety that unconsciousness with a several-minute amnesia could be produced without the risk of muscular contractions of sufficient strength to cause trauma. It also seemed probable that a preliminary subconvulsive shock raised the electrical convulsion threshold, and it has been reported that subconvulsive shocks cause a serious fall in blood pressure (Silfverskiöld and Amark, 1943) and even cardiac arrest (Kalinowsky and Hoch, 1946). The use of subconvulsive shocks was therefore abandoned.

Preliminary anaesthetization with thiopentone ("pentothal") was found to be a much more satisfactory method of producing amnesia. No patient to whom we have administered thiopentone has remembered anything of either the curarization or the convulsion. Thiopentone has the additional advantages of aiding *d*-tubocurarine in combating the post-convulsive rise in blood pressure, in lessening post-convulsive excitement, and in minimizing the likelihood of bronchospasm which may occasionally follow the injection of curare-like drugs. Contrary to the observations of other workers who have used general anaesthesia with E.C.T. (Neustatter and Freeman, 1939; Fabing, 1942) we have not observed any tendency for thiopentone to increase the electrical convulsion threshold. If anything, the threshold appeared to be lowered, possibly because the thiopentone reduced the patient's excitement and apprehension, which is known to increase the electrical threshold (Kalinowsky and Hoch, 1946). In no case have we failed to induce a convulsion following administration of thiopentone.

Serious respiratory depression resulting from diaphragmatic paralysis is the chief danger of curare-controlled E.C.T., and unless facilities for controlled respiration are at hand a fatality can occur. There are four deaths reported in the literature from curare-controlled convulsion therapy, two of them most probably from respiratory paralysis (Charlton *et al.*, 1942; Cash and Hoekstra, 1943; Smith *et al.*, 1943; Bennett, 1943). Most of our patients were insufflated with oxygen under slight pressure, by means of an apparatus devised by Dr. Lucas, during the period between the administration of the *d*-tubocurarine chloride and the shock, and again following the convulsion if there was the slightest sign of cyanosis or respiratory depression. Unless a large overdose of drug is given the diaphragm recovers its function fairly quickly. In the present series of cases it did not become necessary to administer respiratory stimulants or "prostigmin," the pharmacological antagonist of *d*-tubocurarine chloride, ventilation with oxygen being quite adequate to combat any respiratory depression. To counteract the salivation produced by *d*-tubocurarine chloride all patients were given atropine sulphate intravenously in a dose of 1/100 to 1/50 gr. (0.65 to 1.3 mg.) at the same time as the latter.

Technique

The treatment was usually given in the morning. Patients had their ordinary sedative the previous night. They were allowed a cup of tea at breakfast-time, but no food in case of vomiting. Blood pressure, pulse rate, and temperature were taken before treatment. No methods of mechanical restraint or attempts to hyperextend the spine were used. *d*-Tubocurarine chloride and atropine mixed in the same syringe were given intravenously, the syringe disconnected, and without removing the needle from the vein an injection of thiopentone administered immediately afterwards from another syringe. The dose of *d*-tubocurarine chloride required to give adequate relaxation was approximately 2 mg. per stone (0.3 mg. per kg.) of body weight, but this dose has to be varied according to the musculature, age, sex, and general condition of the patient. If the initial injection of *d*-tubocurarine chloride failed to soften the convulsion sufficiently it was increased in subsequent treatments. The lowest effective dose in the present series was 14 mg., and some very muscular male patients were given as much as 30 mg. without achieving full curarization. Generally speaking, males require more than females and the young more than the aged. The usual dose of thiopentone was 0.3 g., but this was increased if any tendency to bronchospasm or laryngospasm was noted at the first treatment. This complication was dealt with by anaesthetizing the patient more deeply with a second injection of intravenous thiopentone or with nitrous oxide and oxygen. After the injection of the *d*-tubocurarine chloride an interval of three to five minutes was allowed for curarization to reach its maximum before administering the electrical convulsion. A mouth gag was used only to prevent the possible biting of the lips immediately after the shock. The patient's limbs were not restrained.

Pulse rate and blood-pressure measurements were taken immediately before and after the convulsion, and at intervals of 15 and 30 minutes later. Temperature readings were taken at half-hourly intervals for two hours after the treatment. Many of the patients were insufflated with oxygen following the convulsion, and occasionally, if there was respiratory obstruction, an airway was inserted. Usually the patients passed into a quiet natural sleep after recovering from the convulsion. Out-patients were allowed to sleep for two hours before going home.

The treatment was usually given to patients twice weekly, and some who did not respond received short daily courses. One or two patients were given two convulsions in quick succession following a single injection of *d*-tubocurarine chloride and thiopentone. The average number of convulsions given was six, but several patients recovered from symptoms after only two or three. The greatest number of convulsions given to one patient was 20.

Clinical Material

d-Tubocurarine chloride and thiopentone were administered to 50 patients undergoing electrical shock therapy for psychiatric illness; approximately half were in-patients and half out-patients. In all 300 treatments were given. The large majority of the patients were suffering from depression, but a few schizophrenics and obsessional states were included. A careful clinical examination was made before the patient was subjected to convulsion therapy, and if any doubt existed as to the condition of the cardiovascular, respiratory, or skeletal systems, electrocardiographic or radiological investigations were first carried out. An attempt was made to collect as many patients as possible in whom unmodified E.C.T. would have been dangerous if not absolutely contraindicated. Included in the series were hypertensive, arteriosclerotic, and senile patients; patients who had previously sustained fractures in unmodified E.C.T. (one vertebral fracture, and one recently wired fracture of the condyloid process of the mandible); a patient who had previously had haematemesis from a peptic ulcer following unmodified E.C.T.; a patient with hernia; and a woman five months pregnant.

Observations

Within three to five minutes of giving the *d*-tubocurarine chloride and thiopentone the patient was relaxed and unconscious, respiration slightly depressed, and breathing mainly abdominal. Immediately after administering the shock the patient gave a slight jerk corresponding to the tonic convulsion, and after a latent period of a few seconds there was a very modified clonic convulsion (see Figs. 1 and 2). The arms, if they moved at all, were flexed slightly,

FIG. 1.—Patient undergoing unmodified convulsion therapy showing the stage of clonic convulsion and necessitating lumbar pads and physical restraint by three attendants.

FIG. 2.—Same patient undergoing electrical convulsion therapy after treatment with *d*-tubocurarine chloride and thiopentone. One attendant only is managing the patient, and in this case no mouth gag was used.

and the fingers were drawn up in the "accoucheur" position seen in tetany. Usually there was no gross movement of the legs. The cry and opisthotonos of the unmodified convulsion were absent. Although the muscles of the face are those most rapidly paralysed by curare drugs, these muscles contract most strongly in the curare-controlled convulsion. The muscles of the eyelids and face twitch repeatedly even when there is no movement of the limbs or trunk, so it is always possible to observe that a "convulsion" is taking place.

Sweating, which normally occurs during and after unmodified E.C.T., was usually absent. Slight depression of respiration with a short period of apnoea occurred in most patients, but apnoea lasting three minutes is also very common in unmodified E.C.T. (Woolley *et al.*, 1942). Slight cyanosis was observed in about a quarter of the treatments given, but this was not so frequent, so deep, or so prolonged as that commonly seen in unmodified E.C.T. Bronchospasm with deep cyanosis, which occurred in three very restless patients, was relieved by a second injection of thiopentone.

There is normally a considerable rise in blood pressure during and just after an induced unmodified convulsion. It may rise well above 200 mm. Hg (Silfverskiöld and Amark, 1943). There is normally an increase of 50 to 60 mm. in systolic pressure (Kalinowsky and Hoch, 1946; Jones and Pleasants, 1943). In this series with curare-controlled convulsions the mean increase in systolic blood pressure was 6 mm. Hg (standard error ±1.7 mm.). The diastolic pressure was much the same after the shock as before. It is possible that the rise of blood pressure in uncontrolled convulsions is partly due to the blood being squeezed from the muscles during their violent contractions and shunted into the general circulation, thus increasing the cardiac output and blood pressure. Stimulation of the medullary centres also undoubtedly occurs. It is conceivable that in convulsions modified by *d*-tubocurarine chloride the blood pressure does not rise appreciably because blood is retained in the vessels of the relaxed muscles.

There was often a fall in pulse rate immediately after the convulsion, followed later by a rise. Sometimes there was a fall in body temperature one-half to one hour after the convulsion. The maximum fall of temperature was 2° F. (1.1° C.), and the lowest temperature recorded was 96° F. (35.6° C.). This occasional fall was presumably due to the *d*-tubocurarine chloride, as there is usually a slight rise in temperature in the unmodified convulsion. A fall in temperature has also been noted in patients receiving *d*-tubocurarine chloride as an adjunct to anaesthesia (F. Evans, personal communication). It was observed that the effects of curarization passed off about twice as rapidly in a patient submitted to a curare-modified convulsion as in a subject receiving the same dose of drug without a convulsion. The most likely explanation is that electrical stimulation liberates increased amounts of acetylcholine at the neuromuscular junction and that this neutralizes the effect of the *d*-tubocurarine chloride.

Post-convulsive excitement, which is common after unmodified E.C.T., was rare in the present series, and when it did occur was checked by a second intravenous injection of thiopentone. Many of the patients on regaining consciousness expressed a wish to sit up. Sitting up usually relieves the feeling of suffocation which sometimes persists for twenty minutes or more after the injection of *d*-tubocurarine.

There were no complications such as fractures, dislocations, or muscle strains following any of the treatments, and the only unpleasant symptoms between treatments were headache and impairment of memory and concentration, which evidently resulted from the electrical convulsion. *d*-Tubocurarine chloride does not appear to influence the therapeutic effect of E.C.T. or to raise the electrical convulsion threshold. The percentage of patients recovered or markedly improved in the present series is roughly what might have been expected if unmodified E.C.T. had been given, but the number of patients is too small and their diagnoses too varied for any statistically significant conclusion to be drawn.

Discussion

The major drawbacks of E.C.T.—namely, fractures, dislocations, and cardiovascular accidents—are largely eliminated by the method described, and post-convulsive excitement is reduced. Preliminary curarization enables E.C.T. to be given to patients to whom unmodified E.C.T. would be dangerous. Mechanical precautions to prevent fractures and dislocations are rendered unnecessary. As no methods of restraint are needed one operator can carry out the treatment single-handed. If the patient should become restless on recovery he can be handled easily as, being lightly curarized, he is able to offer only feeble physical resistance.

The dose of both *d*-tubocurarine chloride and thiopentone needs careful assessment. Just enough barbiturate is required to produce about five minutes' narcosis, and sufficient *d*-tubocurarine to make fracture or dislocation impossible but not to depress respiration too deeply. No

patient should be given a curarizing drug unless efficient facilities for controlled respiration with oxygen are at hand and the administrator is competent to deal with the apnoeic patient. The injection of stimulants and analeptics cannot replace the provision of a clear airway and rhythmic insufflation of oxygen using a tightly fitting face-mask Without the precautions described the treatment advocated might be disastrous, but we feel that with adequate precautions curare-controlled E.C.T. is so much safer than unmodified E.C.T. that we intend to adopt it as a routine procedure. We believe that if patients are curarized with due care the benefits of E.C.T. can be extended to those in whom it would be normally contraindicated. The therapeutic results of convulsion therapy do not depend on the production of a "convulsion," as originally suggested by Meduna (1935), because the end-results are just as good whether the curare-modified or the unmodified convulsion technique is used (Bennett, 1941).

Summary

The use of *d*-tubocurarine chloride and thiopentone for modifying electrical convulsions is described. In the dosage employed these drugs do not significantly affect the electrical convulsion threshold.

The advantages claimed for the method are: the traumatic complications of E.C.T. are avoided; there is no serious rise in blood pressure; it enables E.C.T. to be given to certain patients in whom otherwise convulsions would be contraindicated; post-convulsive excitement is minimized; the procedure can be carried out single-handed if desired; and the unpleasantness of E.C.T. for the patient is almost entirely eliminated.

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A registry of primary malignant tumours of bones has been set up with its headquarters at the Department of Pathology, the Royal College of Surgeons of England, with the intention of collecting records of cases of primary tumour or presumed primary tumour of bone (including joints and cartilages), especially those in which cure or prolonged alleviation has been attained by treatment. All cases claimed as five-year cures will be considered by the committee, but in future only those cases will be considered in which histological proof of the nature of the tumour can be obtained by biopsy or following amputation. In cases where histological diagnosis is in doubt the Consultant Panel in Morbid Histology, set up by the Pathological Society of Great Britain and Ireland in conjunction with the British Empire Cancer Campaign and the National Radium Commission, will be consulted. Those interested are invited to send records of relevant cases with amputation or biopsy specimens to Prof. R. A. Willis, M.D., F.R.C.P., Royal College of Surgeons, Lincoln's Inn Fields, London, W.C.2. Donors will be sent reports on the pathological investigation of specimens received, and in return will be asked for follow-up information regarding patients.

USE OF CURARE IN "POOR-RISK" PATIENTS

BY

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This paper is based on 136 surgical cases in which curarization was performed at Hill End Hospital (St. Bartholomew's), and includes the observations of all the members of the anaesthetics department. All of these patients underwent operations of some severity, while most of them were in the "poor-risk" category. An analysis of the operations undertaken in this series is given in Table I.

TABLE I.—*Operations Recorded*

Partial gastrectomy	31	Hysterectomy	25
Cholecystectomy	7	Thoracoplasty	14
Resection of large gut	6	Lobectomy	8
For relief of intestinal obstruction	4	Pneumonectomy	3
Other laparotomies	11	Ligation of patent ductus	2
Lumbar ganglionectomy	3	Pericardectomy	1
Urogenital operations	3	Other thoracotomies	14
Incisional hernia	2	Oesophagotomy	1
Resuture of burst abdomen	1	Total	136

Preparations and Dosage

I have used the general name "curare" to embrace all preparations not specifically designated. "Intocostrin" (Squibb), *d*-tubocurarine chloride crystals, "curarine" and "tubarine" ampoules (Burroughs Wellcome) have all been employed. The curarine chloride crystals were made up by us in a 1% solution in sterile distilled water or para-chlorcresol which was brought to the boil before bottling. It is impossible adequately to sterilize the crystalline powder in the autoclave. The potency of these preparations remained fairly constant as long as required, in some cases up to six months. An initial dose of 3 ml. of intocostrin or 15 mg. of curarine or tubarine was used for abdominal cases, with half the dose usually repeated later for closure of the peritoneum. All injections were made intravenously. The exact calculation of the dose by body weight has the theoretical objection that the number of the patient's myoneural junctions and his weight may not stand in direct relation. The dose was only slightly reduced for children, though very ill and feeble persons, with their slowed metabolism, need less curare and exhibit a prolonged effect. Individual reaction to the drug appears to be very variable, but there are too many factors modifying the patient's response to allow of accurate judgment.

All these preparations seemed generally to be reliable, although once intocostrin and once some curarine chloride made up by us failed to produce the effect expected. Neither of these failures can be attributed to the drugs, as subsequent injections from the same bottles produced the usual results. In the latter case the respiration remained adequate, and a considerable amount of ether was given before a lumbar sympathectomy could proceed with tranquillity.

Indications

Limitation of supplies demanded careful selection of cases, curare being used almost exclusively for abdominal and chest operations, particularly with "poor-risk" patients. There would seem to be little point in using curare for procedures where considerable muscular relaxation or very quiet respiration is not called for, as such operations can often be carried out under the narcosis induced as a preliminary to curarization.

Technique for Abdominal Cases

Premedication.—The usual premedication for fit adults was omnopon gr. 1/3 (22 mg.) with scopolamine gr. 1/150 (0.43 mg.). In some cases mist. hyoscin. "A" (7 minims, or 0.42 ml., for men; and 5 minims, or 0.3 ml., for women) was substituted. Morphine and atropine in appropriate doses were employed for the young, the old, and the ill, while "seconal" and atropine were given to children.

Induction.—Up to 0.5 g. of thiopentone (pentothal) was given, and blind intubation performed after the administration of a few breaths of a mixture containing nitrous oxide, oxygen, and carbon dioxide and a small percentage of trilene. Should blind intubation have failed we were prepared to give 15 mg. of curarine and perform direct laryngoscopy at once. Thiopentone and curare have been given in rapid succession or mixed, and direct laryngoscopy performed with a Magill laryngoscope, but this was often accompanied by some coughing and straining. We have been chary of giving the curare before the thiopentone, as recommended by Gray and Halton (1946b), in view of the report by Prescott, Rowbotham, and Organe (1946) of the subjective effect of a small dose on the conscious subject. Intubation was performed in every case for the reason put forward by the latter three workers—complete control of the respiration at all times. Endotracheal tubes were lubricated with 5% "nupercaine" in "K-Y" jelly.

Maintenance.—Maintenance was by means of nitrous oxide–oxygen and minimal trilene from a semi-closed Boyle apparatus. Ether was used in place of trilene in earlier cases in the series. About 50% oxygen was given to ensure adequate oxygenation, no attempt being made to maintain the anaesthesia by nitrous oxide–oxygen alone. An adjuvant was often needed to prevent movement, and for this purpose a trace of trilene was added to the gases at the beginning of the operation, and for short periods later if required. We have employed this thiopentone–N_2O+O_2–trilene technique without curare for large numbers of orthopaedic, neurosurgical, and similar procedures, with satisfactory maintenance and little post-operative morbidity and discomfort. It is important that only a trace of trilene be employed—not more than at the rate of ½ drachm (3.5 ml.) an hour. Should this be insufficient a change-over to another agent should be made, instead of "pushing" the drug (Hewer, 1944). Trilene is preferable to ether as it produces less post-operative vomiting and probably fewer pulmonary complications, while recovery is not delayed and is free from the unpleasant taste and smell associated with ether. It seemed unsound to employ thiopentone as an adjuvant during operation, in view of the possibility of respiratory depression, noticeably lacking with trilene, being added to the respiratory paralysis, as well as the inevitable prolongation of recovery time if thiopentone is employed in any quantity. In cases where ether was used its "curariform" action was noticeable. Curare was given when the peritoneum was first reached, further doses being added as relaxation demanded. With this technique patients invariably left the table with their reflexes fully returned, frequently moving the head and limbs. Mental clarity, with full co-operation, returned rapidly.

Technique for Thoracic Cases

Premedication was the same as that in general cases.

Induction.—Up to 0.5 g. of thiopentone was followed by cyclopropane–oxygen. Blind intubation was performed under light anaesthesia with a No. 7 or 8 Magill tube anointed with 5% nupercaine–K-Y jelly. A Cobb adapter and throat-pack were usually employed. Once the patient had settled down the cyclopropane was turned off. An intravenous blood drip was then set up. Just before the patient was wheeled into the theatre 15 mg. of tubarine or its equivalent was given, administration at this point preventing coughing when the patient was turned on to the table. The insertion of an endotracheal tube was considered essential to provide respiratory control and a perfect airway in an awkward position, and to remove secretions (even in allegedly "dry" thoracoplasties) as soon as they were suspected.

Maintenance.—It was often difficult to decide whether to add more cyclopropane to the circuit or another dose of curare to the drip, as it was attempted to maintain the patient with quiet automatic respiration on the one hand and to prevent the possibility of coughing on the other. If the respiration increased in depth 5 mg. of tubarine was given, while any movement or an increase in respiration rate (so long as the possibility of anoxia did not arise) was taken as a call for more cyclopropane; 500 ml. added to the circuit for one minute usually provided quite enough. We reasoned that the uncurarized patient under too light anaesthesia would respond to stimuli by coughing and by an increase in the depth and rate of respiration. As the first two responses were abolished by curare the last of the triad would indicate lightening anaesthesia. In view of the unstable pulse rate produced by cyclopropane and intrathoracic manœuvres, this was ignored as a sign of inadequate narcosis. Gray and Halton (1946b) report this sign particularly under barbiturate narcosis. Arrhythmias were, however, strikingly uncommon with this technique. It must be confessed that the signs of depth of anaesthesia and curarization were most difficult to evaluate. Tracheal tug occurred quite commonly, and was abolished by further curare. Aided respiration was frequently employed as needed.

About 15 to 20 mg. of tubarine was required for a first-stage thoracoplasty, and about 20 to 30 mg. for a lobectomy or pneumonectomy. More was needed for operations performed under controlled respiration, such as repair of diaphragmatic hernia. The results in chest cases were most striking. The blood pressure remained steady, even in severely ill patients, for much longer than in those operated on under cyclopropane alone, all the patients becoming alert, co-operative, and moving almost as soon as they were returned to bed. The temperature returned to normal within one to two hours, and the pulse and blood pressure rapidly recovered from any deterioration. Moreover, the patients felt much better after operation than uncurarized patients undergoing similar procedures. Curare seems to be of maximum benefit to the unfit subject needing thoracic surgery.

Treatment of Laryngeal Spasm

Tubarine 10 mg. was given intravenously to two patients who developed severe laryngeal spasm during induction, producing almost instantaneous relaxation of the adductors of the cords with the restoration of a clear airway. This use of curare has been reported by Organe (1946).

Complications

Ocular Complications (Table II).—Twenty cases with eye trouble after the use of curare have been seen. In most instances the complaint about the eyes was volunteered, otherwise the patient was subjected to the most

TABLE II.—*Ocular Complications*

No. of Cases	Duration of Symptoms		Diplopia	Blurring of Vision	Pain	Ptosis	Spots
	Up to 24 hrs.	Over 24 hrs.					
20	9	11	5	13	5	2	2

guarded questioning. Blurring of vision was the commonest fault complained of, often accompanied by one or two other defects. In more than half the cases the symptoms persisted for over 24 hours, but never longer than three to four days; all of them began with the return of consciousness. One patient showed a "myasthenia gravis" effect, in which ptosis occurred and accommodation failed after reading for a short while, to return to full efficiency after a rest. In another case prostigmin, administered for retention of urine following hysterectomy, immediately cured an incidental blurring of vision. A further patient, who was given curare for the first and second stages of a thoracoplasty, developed blurring of vision on both occasions. The analogy between the pathology of myasthenia gravis and the pharmacology of curare is, however, not a true one. In myasthenia no impairment of pupillary function occurs (Walshe, 1943). Nothing abnormal was found on examination of the eyes. Apparently similar ocular complications did not occur after ordinary general anaesthesia, as none of the patients volunteered information to this effect. So far as can be gathered from such a small series, the anaesthetic agent has no effect on the subsequent complications.

These phenomena may be due to a "hang-over" action of the curare. The muscles concerned are unique in being suddenly put to full use almost immediately consciousness returns and in producing, through slight defects, an effect easily apparent to the patient. This was particularly the case in the presence of a pre-existing compensated slight fault. One is tempted to surmise that all the muscles of the body may suffer in some degree from the effects of curare for some time after operation.

Amnesia.—One case anaesthetized with thiopentone 0.5 g., N_2O–oxygen, and trilene, with 15 mg. of tubarine, developed prolonged drowsiness and amnesia for the 24 hours following operation, although this is more likely to have been due to the thiopentone than to the curare. Similar cases have been reported by Landau and Wooley (1934).

Effect on Blood Pressure

There seems no doubt that increased bleeding occurs after curarization and that the blood pressure very commonly rises a matter of 10 to 20 mm., while in one case a rise from 125/90 to 200/130 mm. was recorded in 35 minutes. This consideration has led to a refusal to administer curare for electro-convulsive therapy in a patient with hypertension. The blood pressure has been seen to fall as surgical stimuli became severe, to rise again as they cease, exemplifying the retention of vasomotor control under light anaesthesia mentioned by Gray and Halton after quoting the work of Zweifach *et al.* (1945). Some cases showed no drop in blood pressure however severe the stimulus. In others the blood pressure seemed to fall as the curare wore off, to be restored by a further injection, although complete relaxation was present.

Post-operative Results (see Table III)

It must be emphasized that not only was curare employed for many operations most likely to be followed by thoracic complications, but as supplies were short the drug was purposely reserved for patients who were considered to be "bad risks." It should further be mentioned that, to give curare as strict a trial as possible, very severe criteria of "chests" and vomiting were applied. Any vomit at all was classed as "slight" vomiting, and any cough with sputum a "minor" chest. In a small series it is impressions that count, not statistics. Our impression was that, though curare proved an inestimable boon in the theatre, it had no effect on the frequency of post-anaesthetic vomiting in comparable operations, and possibly slightly reduced the incidence of anticipated chest complications. The patients recovered consciousness much sooner and recovery was more pleasant—not inconsiderable advantages; otherwise there was no difference post-operatively whether curare was given or not. The greatest advantage of curare is that it enables very ill patients—particularly those needing thoracic surgery—to undergo operation without a dangerously prolonged deep anaesthesia and to recover rapidly from the immediate effects of the operation.

Deaths following Curare

Eight patients died some time after receiving curare. All of them were in poor physical condition before operation, and they represent a high proportion of the total surgical mortality in the hospital for the period. One patient died of peritonitis five days after a subtotal gastrectomy. The others succumbed to heart failure, in two cases accompanied by bronchopneumonia and in one case by acute dilatation of the stomach. One patient suffered two coronary thromboses twelve hours after a cholecystectomy; two had extensive carcinoma of the stomach, and two more were severely ill with intestinal obstruction. Another was undergoing lobectomy for multiple abscesses in the middle lobe of the right lung. A further patient developed Stokes-Adams attacks after an exploratory laparotomy (for which curare was used), and died of one of these attacks after a second curarization for resuture of a burst abdomen. One patient died in the theatre, and the others at periods between four hours and fourteen days after operation.

Necropsy in the last seven fatal cases confirmed the cause of death as heart failure and demonstrated a fat flabby heart with coronary sclerosis of varying severity; one case had in addition bilateral obliterative pleural adhesions. Only one patient showed respiratory depression requiring controlled respiration in the theatre, and in no case was anoxia allowed to occur. Although curare cannot be implicated in any of these cases, in which death would probably have occurred whatever form of anaesthesia was used, it is worth noting that the two fatal cases in Gray and Halton's (1946a) original series present a similar picture. There is still the possibility that further investigation of the pharmacology of curare may reveal some action upon the heart.

Summary

Observations are recorded on 136 cases in which curare was administered, mainly for severe operations in patients of the "poor-risk" type.

TABLE III.—*Post-operative Results*

Agent	Chest Complications				Vomiting			Ocular Complications	Ileus and Acute Dilatation of Stomach
	Major	Minor	Aggravated	Total	Little	Much	Total		
Nitrous oxide–oxygen–trilene (69 cases) ..	5·8	10·2	7·3	23·3	23·2	2·9	26·1	14·5	1·5
Nitrous oxide–oxygen–ether (28 cases) ..	—	25·0	10·7	35·7	42·8	7·4	50·2	17·9	3·7
Oxygen–cyclopropane (39 cases)	—	—	17·9	17·9	33·3	15·4	48·7	12·8	—
Total	2·9	10·3	11·0	24·2	30·1	7·3	37·4	14·7	1·5

The efficacy and dosage of curare preparations are considered, and techniques employing trilene for abdominal cases and cyclopropane for thoracic cases described.

Twenty cases with ocular complications are reported. The effect of curare on the blood pressure and on severe laryngeal spasm is also mentioned.

An analysis of post-operative results is given and eight deaths after curarization are discussed.

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d-TUBOCURARINE CHLORIDE IN ELECTRO-CONVULSION THERAPY

BY

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AND

D. D. WEBSTER, M.B., B.S.

It is now generally known that *d*-tubocurarine chloride is used to obtain good relaxation in general anaesthesia. Its value as an aid in electro-convulsion therapy may, however, be of equal importance. Griffith (1946) reviews the history and present knowledge of the clinical use of *d*-tubocurarine chloride, with special reference to anaesthesiology, and discusses the physiological action of the drug. A further review of the literature is given by Kellgren *et al.* (1946).

An obstacle to the use of electro-convulsion therapy in feeble persons has been the strain imposed on the skeletal structure by the violent muscular contractions produced. *d*-Tubocurarine chloride enables electro-convulsion therapy to be given in cases in which the physical condition would otherwise be a contraindication.

Methods.—The drug is given intravenously, and in our experience it is advisable to test the patient's tolerance with small doses before electro-convulsion therapy. We commence with 1 mg. per stone (6.4 kg.) of body weight, and this is increased on successive days until the patient is just unable to raise the head from the pillow after about four to five minutes. Electro-convulsion therapy is then given in the usual way.

One of our cases was a woman who in attempting suicide had sustained a fractured surgical neck of the humerus and a fractured pelvis. She was in a state of acute melancholia and actively suicidal. Electro-convulsion therapy was required, but the recent bone injuries made its administration impracticable. Under the influence of 15 mg. of *d*-tubocurarine chloride the electroplexy produced a mere "purring sensation" in the muscles. This procedure was repeated on six occasions and she made a good psychiatric recovery; and she was up and about, with a good orthopaedic result, when she left hospital.

Another illustrative case was that of a reactive depression in a man of 34 who complained of severe pain in his back after one dose of electro-convulsion therapy. *X*-ray examination showed no bony injury of the vertebrae, but in the ordinary way treatment would have been discontinued. With *d*-tubocurarine chloride it was possible to continue treatment. His pain has now gone and he has made a social recovery. This was one of our early cases, and an initial dose of 20 mg. was given. There was marked respiratory paralysis and apparent loss of consciousness. The pulse remained of good volume and regularity throughout, and after about five minutes' artificial respiration normal respiratory rhythm recommenced. An interesting feature was that the patient was later able to give an account of the artificial respiration and other restorative measures (physostigmine, etc.), taken during a period when he appeared to be deeply unconscious. It seems then that the drug, despite its dramatic effect on motor activity, had little influence on the sensorium. This is in agreement with the findings of Kellgren *et al.* (1946).

Conclusion.—*d*-tubocurarine chloride appears to be effective in minimizing convulsions in electro-convulsion therapy. Although both *d*-tubocurarine chloride and electro-convulsion therapy are respiratory depressants no synergistic action between the two has been noted with the relatively low dosage used.

We wish to thank Dr. F. Back, Medical Superintendent, Cherry Knowle (Sunderland Mental Hospital), for providing the facilities for this work.

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Medical Memoranda

Unusual Case of Poisoning by Zinc Sulphate

The following case seems worth recording because of the unusual sequelae. In the literature at my disposal I cannot find any description of a similar sequence of clinical events.

CASE HISTORY

An Indian woman aged 35 was admitted into the General Hospital, Johore Bahru, Malaya, at 9.30 a.m. on March 4, 1946. About one and a half hours previously she had taken a dose of "salts" for constipation, and this was followed in a few minutes by vomiting and purging. The substance swallowed was mistaken for Epsom salt, and approximately 1 oz. (28 g.) was taken. The bottle with the remaining noxious contents was brought to hospital, and the white crystals proved on analysis to be zinc sulphate. The vomitus contained the same substance.

On admission the patient was acutely collapsed and very restless. There was no abnormality of the lips, tongue, or buccal mucosa. Treatment with demulcents, morphine, and nikethamide produced marked improvement within twelve hours. On March 5 her general condition was satisfactory, and vomiting had ceased. There had been no haematemesis. She complained of abdominal pain of a colicky nature, but examination revealed no abnormality. The temperature was normal, there was a persistent tachycardia of 90 to 100 a minute, and examination of her urine showed no abnormality, chemically or microscopically. On the 6th progress was well maintained, and there was no blood in the stool. Next day the improvement continued, but she vomited two *Ascaris lumbricoides*. At about 8.30 a.m. on the 8th I was informed that the patient had suddenly collapsed. On examination she was found to be semi-comatose with a marked ketosis. Blood was sent for estimation of the sugar content, and a catheter specimen of urine for examination. Insulin therapy was immediately instituted, 60 units of the soluble product, of doubtful potency, being given intramuscularly, as the intravenous route was impossible owing to collapse. Nevertheless, the patient's condition continued to deteriorate and she died at 7.30 p.m. The blood sugar was 380 mg. per 100 ml., and the urine was loaded with albumin, sugar, and ketones.

Necropsy was performed at 2.30 p.m. on March 9; the report was as follows: "The body was that of a fat woman of average build. Rigor mortis was absent. The peritoneal cavity contained about 4 oz. (114 ml.) of blood-stained fluid; there was no evidence of fat necrosis. Liver: size normal; rather fatty. Gall-bladder: size normal; contained six faceted pigment stones. Spleen: normal. Kidneys: both intensely congested and haemorrhagic. Suprarenals: congested. Pancreas: size normal; generally congested; the tail was very intensely haemorrhagic. Stomach: very congested; mucous membrane eroded and, in places, desquamated; no perforation. Bowel: congested only; no perforation. Bladder: normal; contained about 2 oz. (57 ml.) of turbid urine which, on examination, showed copious albumin, sugar, ketones, and blood—microscopically there were numerous erythrocytes and epithelial cells. Pleural cavities: normal. Lungs: normal. Pericardial sac: normal. Heart: somewhat flabby; otherwise normal." Samples of pancreas, kidney, liver, and suprarenals could not be examined histologically, as facilities did not exist.

COMMENTARY

This seems to be a clear case of poisoning by zinc sulphate. Treatment of the original collapse was successful, and progress was well maintained until the fifth day, when hyperglycaemic coma developed. Unfortunately the circumstances precluded daily examination of the urine, otherwise pancreatic insufficiency and renal damage might have been noted earlier. Nevertheless, twelve hours before the onset of coma no premonitory symptoms or clinical signs of hyperglycaemia were observed. It is regrettable that histological examination of the tissues mentioned could not be carried out, but in view of the gross pathological findings at necropsy I feel that this case should be regarded as one of haemorrhagic pancreatitis and widespread renal damage as a result of poisoning by zinc sulphate, with hyperglycaemic coma and death supervening on the fifth day.

My thanks are due to Major S. N. Mittra, I.A.M.C., who carried out the post-mortem examination.

GEORGE A. B. COWAN, M.B., Ch.B.,
Malayan Medical Service.

Post-partum Intra-abdominal Separation of Uterus

The following report of what must be a very rare condition may be of interest.

CASE HISTORY

On March 28, 1946, at 10 a.m., a primiparous European woman of medium build, 25 years of age, spontaneously gave birth to a male child of 8 lb. (3.6 kg.), after having been in labour for 8½ hours, a nurse only attending to her at home. No difficulties were experienced during this stage of the confinement; the placenta, however, appeared to be adherent, and all attempts by the nurse to expel it proved fruitless. It is stated that the patient had some diffuse haemorrhage, but no clots were passed. At 12.30 p.m. (2½ hours after being confined) the doctor was called, and he is alleged to have given her three injections: first 0.5 ml. ergometrine subcutaneously, then 10 ml. calcium gluconate intravenously, and half an hour afterwards a second 0.5 ml. ergometrine subcutaneously. The patient claimed that the doctor did not attempt to expel the placenta, nor did he examine her abdomen or make any other examination. Her condition continued to deteriorate, and she was admitted to the Germiston Hospital at 5 p.m. (seven hours after confinement). On admission she was in a state of collapse, with a feeble pulse and a blood pressure of 60/20 mm. Hg. She was very anaemic and somewhat restless, and there was a slight continuous ooze of bright red blood. The uterus was in a state of contraction. Pressure on the abdomen was resented. A blood transfusion of 1,000 ml. of whole blood was given, followed by 1,000 ml. of serum.

Operation.—At 11 p.m. the patient's condition was considered sufficiently improved to attempt a manual removal of the placenta, and the operation was performed by a house-surgeon, with the patient under a general anaesthetic. After having worked for twenty-five minutes he discovered omentum at the vulva. At this stage a further 1,000 ml. of whole blood was being transfused, although there was no excessive haemorrhage during this operation. I was then called into consultation, and was able to open the abdomen twenty minutes after the discovery of omentum in the introitus. To my surprise I found the uterus completely severed: not a tag connecting uterus and host remained. Apart from a fair amount of blood in the abdominal cavity, only three relatively small bleeding points were found—one on either side in the round ligaments of the ovaries, and a third in the right uterine fold—which were clamped and ligatured. The uterine arteries could not be seen, nor was there any retroperitoneal haemorrhage. The stretched cervix was torn through and severed from the body of the uterus, with a fair-sized flap of peritoneum anteriorly. The broad bands with round ligaments of uterus and ovaries presented a continuous flap on either side; the Fallopian tubes, however, were torn off separately. Both ovaries were intact. There was no damage found on any of the adjoining viscera or ureters. With some reluctance it was decided not to look for the uterine arteries, as there was no sign of haemorrhage from them. The condition of the patient was somewhat precarious, and ligating these arteries would also have involved

Photograph of the uterus, showing the protruding umbilical cord and placenta, and the attached pieces of the uterine arteries.

ligating a major branch of the internal iliac artery. Very little trimming of the cervix stump was necessary. It was stitched, peritonealized, and the wound closed. The operation lasted about thirty minutes.

Her recovery was uneventful. She received penicillin (20,000 units three-hourly) and sulphadiazine (2 tablets four-hourly) with mist. pot. cit. for the first four post-operative days. During these four days she had to be catheterized, after which she passed urine spontaneously. On the third post-operative day her blood pressure was 130/80 mm. Hg, and her temperature, which showed a slight elevation (102° F.: 38.9° C.), settled to normal on the fourth day. She was discharged from hospital on the seventeenth day. On April 29 (one month after operation), when I last examined her, she enjoyed excellent health, and was apparently no worse for the loss of her uterus.

The specimen consisted of a contracted uterus with the placenta *in situ*, a few inches of umbilical cord and a bit of placenta protruding. On examination the placenta did not appear to be adherent. The circular tear went through the stretched cervix near the body of the uterus. Anteriorly the specimen was largely stripped from its peritoneum, while posteriorly the serosa was left intact. Both sides of the specimen showed tags of ligamentous tissue derived from the round ligaments of uterus and ovaries. Small ends of the Fallopian tubes were also left intact. Long pieces of the uterine arteries were attached to the specimen 3½ in. (8.9 cm.) on the right side and 2½ in. (7 cm.) on the left side, apparently torn off at their origins from the internal iliac arteries (see Fig.).

COMMENT

This patient made a definite statement that prior to 11 p.m. on the day of her confinement she had not had an anaesthetic, nor had she been examined per vaginam either by the nurse or by the doctor, yet there had been diffuse bleeding to account for her collapsed condition. The ergometrine injected at 12.30 p.m. and 1 p.m. respectively apparently accounted for the contracted state of the uterus. One may ask, Was there a uterine tear prior to the house-surgeon's operation, and, if so, how had it happened? Is it possible to cause a uterine tear by exercising abdominal pressure, or by Credé's method of expelling the placenta? Whatever the answer may be, the patient's survival after such a gross lesion must be without parallel.

Germiston, Transvaal, S. Africa. J. J. S. WASSENAAR.

Reviews

INTRODUCTION TO PHYSIOLOGY

The Physiology of Tissues and Organs. (An Introduction to the Study of Systematic Physiology.) By Douglas H. K. Lee, M.D., F.R.A.C.P. Professor of Physiology, University of Queensland. (Pp. 159; illustrated. No price given.) Brisbane: University of Queensland. 1946.

This little book is most entertaining, and we should like to see it made available in this country. Although it is intended for the use of the author's own classes, it would be potently thought-provoking to any student beginning the study of physiology. Indeed, it would be of value to any teacher of the subject, too, and to students already well on the way.

We have seen no other book at all like it. The main line of approach is by way of general biology and general physiology. The systems are dealt with in a general way, and then some examples of integration of function and of practical applications of physiological knowledge are discussed. There is little reference to the biochemical aspect of the subject, the reason given by the author being that it is treated as a separate discipline. (The physiologist might ask what this "special discipline" of biochemistry is.) The author, however, is careful to point out that what his teachers have put asunder the student must try to join together, so that the knowledge "possessed by the student when he leaves the department should be a unified knowledge." This is not a criticism of the book; the author is in the same difficulty as most other physiologists in these days when people talk of unity but act as separate units—presenting, perhaps, a picture of unity in diversity. Prof. Lee's book is refreshingly original, and we congratulate the author on the production of a useful guide.

C. LOVATT EVANS.

SURFACE ANATOMY

Surface and Radiological Anatomy for Students and General Practitioners. By A. B. Appleton, M.D., W. J. Hamilton, M.D., F.R.S.Ed., and G. Simon, M.D., B.Ch., D.M.R.E. Second edition, rewritten. (Pp. 332; 390 figures. 31s. 6d.) Cambridge: W. Heffer and Sons.

This standard work is a valuable guide to the examination of the living subject by methodical observation, palpation, and skiagraphy. The authors have introduced new skiagrams and illustrations into this edition, and substantially improved the text. The difficulty often experienced by beginners in interpreting certain skiagrams and the appearances seen in fluoroscopy will be reduced by studying the reproductions of normal skiagrams taken from the anterior, posterior, and oblique viewpoints and showing distinctly certain "landmarks" whose location, when understood, gives the key to the whole picture. Moreover, the authors explain their technique lucidly and in sufficient detail to reveal the principles underlying kymography and tomography as well as more ordinary radiological methods. The use of contrast media in the examination of hollow organs and tubes is also admirably described and illustrated. Many skiagrams are shown beside drawings of the corresponding parts—for example, heart and large blood vessels exposed by removal of the overlying structures—an arrangement which facilitates the interpretation of certain details in the *x*-ray pictures.

Special features of the book are the skiagrams and descriptions of the skeleton, including the centres of ossification and epiphyseal disks; the illustrations of the joints in various positions of the limbs; the grouping of the muscles according to their functions; the clear representation of the "motor points" as seen in relation to muscular elevations of the overlying skin in a well-developed subject; and the accounts of segmental distribution of the nerves, with tables, and of the radiological examination of the thoracic, abdomino-pelvic, and cerebrospinal regions. The reader studying the book and verifying each point by examination of a living subject will attain in a relatively short time knowledge that the authors have spent many years in gathering. All concerned are to be congratulated on having produced a work that will serve both as a textbook in the initial stages of anatomical study and as a reliable book of reference for practitioners.

R. J. G.

NURSING IN INDUSTRY

Nursing in Commerce and Industry. By Bethel J. McGrath, R.N. For the National Organization for Public Health Nursing. (Pp. 356. $3.00 or 16s. 6d.) New York: The Commonwealth Fund. London: Oxford University Press. 1946.

The author of this book was formerly the industrial nursing consultant of the National Organization for Public Health Nursing, and with the sponsorship of this organization she undertook to prepare a comprehensive guide to the manifold duties of the industrial nurse. A few of the more technical portions of her subject are the work of other hands. Dr. Alice Hamilton points out in an introduction that the book is not only for nurses but for the general public as well.

It is stated that the earliest record of a nurse being employed in an industrial concern in the U.S.A. was in 1895. Progress was very slow at first, and it needed the stimulus of the two world wars to establish adequate nursing services. By 1918 some 1,200 nurses were employed in industry, and in 1937 there were 2,200. By 1941 the number had risen to over 6,000, and by 1943 to nearly 13,000. The relationship of the nurse to the industrial organization under which she is to work and her duties and responsibilities are fully described. In an interesting chapter on mental hygiene some of the types of people specially needing help are discussed. They include the fault-finder, the misfit, and those suffering from hysteria, money troubles, and family difficulties. In the chapter on control of communicable disease, respiratory diseases and especially tuberculosis are dealt with at length. The book can be cordially recommended as an up-to-date account of nursing services in the U.S.A., but it makes no reference to experiences in Great Britain.

H. M. VERNON.

BACTERIOLOGY FOR STUDENTS

A Textbook of Bacteriology. By R. W. Fairbrother, M.D., D.Sc., F.R.C.P. Fifth edition. (Pp. 480; illustrated. 17s. 6d.) London: William Heinemann Medical Books. 1946.

This popular book, now in its fifth edition, is admirably suited to the medical student's needs. The author emphasizes the theoretical aspect of the subject and its important applications in medicine, omitting technical detail which is either superfluous or better learnt at the bench. There are a few new illustrations—the inclusion of more would improve the book; and the coloured plate of tubercle bacilli, some of which are shown unnaturally curved, might be redrawn. Chemotherapy and its laboratory uses are now discussed in a separate chapter, and are referred to also in connexion with each susceptible micro-organism.

L. P. GARROD.

BIOCHEMISTRY ON THE CONTINENT

Exposés Annuels de Biochimie Médicale. Published under the direction of Michel Polonovski. Sixth edition. (Pp. 301. 580 francs.) Paris: Masson et Cie.

This issue of the French annual review of medical biochemistry will be welcomed by many readers in this country, for during the war Continental literature was not easily accessible here, and the book contains many articles which discuss work done in France and other European countries during those years. For instance, there is an article by Polonovski and Busnel on the biochemistry of pterines, a group of substances which have recently become interesting in view of their relation to folic acid, fully reporting the work of Wieland and his school on their chemical constitution and synthesis. Data are given on the distribution of pterines in the animal kingdom, and their possible functions in metabolism are discussed. Sannié contributes an article on pigments and antibiotics of bacteria and fungi. Roche reviews the work on enzymes which contain a

dissociable metal—a group characterized by an easily ionizable mineral constituent which can be removed and, in some cases, replaced by another similar metal. In the iron-containing enzymes—e.g., peroxidase and catalase—the metal is firmly built into a "prosthetic group" of the same type as the haemin of red blood pigment, but there are many enzymes where the metal ion has the character of a coenzyme which can easily be removed by dialysis. In some cases the metal becomes dissociable only after treatment of the enzyme, and other enzymes can be reactivated by metal only when special organic coactivators are added.

Fromageot discusses certain aspects of sulphur metabolism, especially the experimental work on the formation of cystine from methionine and on the oxidation of the sulphur contained in the amino-acids cysteine, cystine, and methionine to inorganic sulphate. He suggests that the first step is the removal of the organically bound sulphur from cysteine and homocysteine as hydrogen sulphide, which is subsequently oxidized to sulphate. This suggestion is supported by experimental evidence published in France during the war. Roskam discusses experiments of his own and his colleagues on the effect of sympatheticomimetic substances on the bleeding time. The chief outcome of his work is the observation that adrenochrome, an oxidation product of adrenaline without sympatheticomimetic action, is as effective as adrenaline itself in reducing the bleeding time. Adrenochrome acts with a shorter latent period than adrenaline, and this is interpreted as indicating that adrenaline acts after being converted into adrenochrome.

The volume also contains a review by Boulanger on the role of sodium and potassium in the animal body and a short discussion by Courrier on functional correlations among steroids. A clearly written and useful article on spectrographic methods in biology is the posthumously published work of G. Florence, who lost his life in 1945 in German captivity.

ASPECTS OF PSYCHIATRY

Modern Attitudes in Psychiatry. The March of Time, 1945. (Pp. 154. 13s. 6d.) New York: Columbia University Press. London: Oxford University Press. 1946.

The New York Academy of Medicine sponsors certain lectures to the laity. The subject decided upon for 1945 was the use of psychiatry in medicine, and the present volume contains reprints of lectures by six distinguished American psychiatrists. In these the modern attitude is admirably set out for the intelligent layman. After a foreword by Dr. Rhoeds, the acting president of the Academy, and an introduction by Dr. Zabriskie, Dr. Galdston opens the series with a historical survey of psychiatry in which he points out that psychological medicine began with Hippocrates and that ancient and mediaeval treatment was indeed really more "psychic" that somatic. Dr. Wall deals in greater detail with the history of the subject since the days of Pinel. Then follows an admirable essay on the social aspects of medicine in which it is shown how illness, even if it is organic, can be modified by emotional stresses and strains, and how the patient can be properly treated only if his whole personality, mind, body, and environment are taken into account. In the fourth lecture Dr. Alexander discusses the future outlook for psychiatry from the psycho-analytic standpoint, but he stresses the need for shorter forms of treatment.

Col. Menninger describes the psychiatric arrangements in the Services and the advances in preventive diagnosis and treatment achieved, with the lessons for peacetime practice. Finally Dr. Weiss, discussing the role of the general physician in psychotherapy, points out that much "minor" psychotherapy can be carried out without specialist knowledge, though "major" psychotherapy must remain the province of the specialist. One of the worst features in the history of medicine according to Garrison and Allbutt was the divorce of medicine from surgery. As Dr. Weiss suggests, an even more unhappy separation may have been the divorce of both from psychiatry.

These lectures are well worth perusal both for their own merits and because they illustrate how even difficult medical problems can usefully be brought before the lay public in an understandable form.

BOOKS RECEIVED

[*Review is not precluded by notice here of books recently received*]

Brompton Hospital Reports. Vol. XIV. 1945. (Pp. 175. 10s.) Aldershot: Research Department of the Hospital. 1947.

Includes articles on pleural and pulmonary suppuration treated with penicillin, prognosis of successful pneumonectomy, pulmonary hydatid disease, surgical treatment of carcinoma of the oesophagus, and a review of pulmonary tuberculosis.

Problems of Malnutrition and Starvation During the War. By Sir Jack Drummond, D.Sc., F.R.I.C., F.R.S. (Pp. 21. 1s. 6d.) Nottingham: University College. 1947.

A reprint of the author's Sir Jesse Boots foundation lecture, 1946.

Diseases of Children. Edited by D. Paterson, M.D., F.R.C.P., and A. Moncrieff, M.D., F.R.C.P. Fourth edition. Vol. I. (Pp. 771. 30s.) London: Edward Arnold. 1947.

This well-known book includes new material on the surgery of congenital deformities, sulphonamides and penicillin for infants, acid-base regulation, anaesthetics for children, abdominal pain, pneumonia, and collapse of lung.

Poisons. By V. J. Brookes and H. N. Alyea. (Pp. 209. 16s. 6d.) New York: D. Van Nostrand. 1947.

A summary of the properties of poisons, and the symptoms and treatments of poisoning.

In Amintirea Profesorului Fr. J. Rainer. (Pp. 123.)

L'Oeuvre Scientifique de Fr. J. Rainer.—Vol. I: Neurologie Végétative. (Pp. 57.) Vol. II: Structure Fonctionnelle. (Pp. 154.) Vol. III: Anthropologie, Morphologie (Varia), Bibliographie. (Pp. 121.)

Le Métopisme Chez les Roumains et en Général. By Fr. J Rainer and Al. Tudor. (Pp. 35.) Bucharest: Impremeria Nationalã. 1946.

The first of these is a memorial volume to Prof. Rainer, of Bucharest, who died in 1944; in Rumanian. The other books are collections of papers by Prof. Rainer, some written in collaboration with other authors; illustrated; in French.

Les Etats Psychopathiques Infantiles d'Origine Syphilitique Héréditaire Larvée. By Henry Brantmay. (Pp. 73. No price.) Geneva: Georg. 1946.

A monograph on the aetiology and symptomology of congenital syphilis; in French.

Legislacion sobre Seguridad e Higiene del Trabajo. By the Ministry of Works. (Pp. 413. No price.) Madrid: Seccion de Prevencion de Accidentes e Higiene del Trabajo. 1947.

An account of industrial health regulations in Spain; in Spanish.

Lehrbuch der Hals-Nasen-Ohren- und Mundkrankheiten. By E. Schlittler *et al.* (Pp. 609. 60 Swiss francs.) Basle: S. Karger. 1947.

A textbook of diseases of the ear, nose, throat, and mouth; intended for students and general practitioners; in German.

Formen und Ursachen der Herzhypertrophie bei Lungentuberkulose. By Prof. W. Berblinger. (Pp. 183. 10.20 Swiss francs.) Berne: Hans Huber. 1947.

A monograph on cardiac hypertrophy in pulmonary tuberculosis; illustrated; in German.

Functional Anatomy of the Mammal. By W. James Leach. (Pp. 231. 12s. 6d.) London: McGraw-Hill Book Company. 1946.

An American guide to the dissection of the cat with an introduction to the structural and functional relationship between the cat and man. Intended as an introductory work for students of anatomy.

A List of Medical Libraries and Information Bureaux in the British Isles. By W. R. Le Fanu. (Pp. 28. 3s.) Oxford: University Press. 1947.

Includes addresses, telephone numbers, short notes on the history and present function of the medical libraries and information bureaux.

War Stress and Neurotic Illness. By A. Kardiner, M.D., and H. Spiegel, M.D. 2nd ed. (Pp. 428. $4.50.) London: Paul B. Hoeber. 1947.

A monograph on war neuroses and the treatment of their acute and chronic phases.

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EASTER EGG

As a token of rebirth to celebrate the coming of spring and the growth of vegetation many nations in antiquity were accustomed to presenting eggs, sporting with them, painting them, or eating them. Persians, Egyptians, Greeks, and Romans all regarded the egg as a symbol of the universe,[1] and the Jews included it in their Feast of the Passover. Whether the custom was incorporated into the Christian festival of Easter from Jewish or Gentile sources is unknown—indeed it is immaterial, for the egg has no great religious significance to Christians but is merely one of the innumerable symbols taken over from pagan folklore. It is not surprising that primitive man, observing birds and snakes and crocodiles and turtles emerging from an apparently lifeless envelope, surmised that some distant ancestor of his own race had once done likewise. According to an old myth from Bengal the first parents of mankind sprang from an egg, and the Chins of Burma relate that a primeval woman laid 100 eggs from which our ancestors hatched to raise mankind's diverse nations. Primitive Greek myth-makers went further and attributed the creation of the universe to the splitting into two parts of a cosmogonic egg. Phobos and Eros issued from these and created the world and its creatures—a fanciful though perceptive account of an individual's creating his experience, his "world," from his fears and loves. According to the Hermetic tradition the egg round which a serpent twined symbolized the hermaphroditic first principle of the universe, matter–spirit; when apart the former represented Chaos, the latter Ether. The conception of the egg as a link between the animate and the inanimate was taken up by the Greek, and later by the Arabian, alchemists, who saw the egg as a symbol on the one hand of the universe, on the other of the philosopher's stone. Elixir of egg, like the cyclotron to-day, would be capable of transmuting metals. (We note in passing that a recent lecture on "ovobiology" was delivered in Belgium with the title "The Egg will Conquer the Atom!") Sometimes the alchemist referred to his vessel as the philosophical egg in which he heated together opposite elements to form the philosopher's stone. A symbolic analogy may be seen between that process and, if one follows the analytical psychologists in regarding it as a symbol of the mind, the man brooding on the elements of his experience in the creation of individuality. We speak also of a hen brooding on her eggs.

Having endowed his eggs with magic, primitive man was not slow to use them for various medical and other purposes. The ancient Egyptians included eggs in a number of medicaments. The following remedy against sores on the anus is recorded in the Papyrus Ebers[2] (written *c.* 1500 B.C.): "Egg of the goose, 1; guts of the goose, 1. Clap on the anus." John of Arderne three millenniums later was recommending white of egg mixed with finely ground flour as a dressing after operating for fistula in ano. Eggs were also popular among the Egyptians as hair restorers and cosmetics, and one face-cream consisted of bullock's bile and ostrich egg beaten up with fresh milk. We need not be surprised that similar concoctions often served the same function in expensive establishments—as "egg shampoos" and "egg packs"—in Britain and elsewhere before the recent war, for primitive ways of thought persist with great tenacity. Black[3] has recorded the popular practice of a patient's boiling an egg in his urine and then burying it in an ant-hill. As the egg disappears so does the malady. Again, owls' eggs mixed with a drunkard's liquor will cure him of his evil ways. Ambroïse Paré in 1536 found that when boiling oil was not available for treating battle wounds the yolk of egg with oil of roses in turpentine was a better therapeutic trick. Perhaps less remote from our own ideas of the uses to which eggs should be put (though remote from our experience) is William Hunter's predilection for them; his dinner at the British Coffee House consisted of two eggs and a glass of claret.

THE EGG AS FOOD

We want eggs because we like them; we miss the contrast of flavour and texture of intact eggs and the physical properties exploited in cooking. Eggs-and-bacon is a national dish—or at least was; eaten solo, eggs are an equal delight; or they can be combined with other foods in scrambled eggs and omelettes. They satisfy the palate and belly of man, whether he is described as an individual or, in the phraseology of Dr. Summerskill, as a calorie-consuming social unit. Their aerating power is used in making sponge cakes; their binding power makes puddings and cakes what they should be; and they for a time stop cakes from becoming stale. The unthinking eater little knows what nutritive value he can extract from an egg. One egg contains about 6 g. of protein, equal to the 16% by which our average daily intake of animal protein has fallen since 1938. In a small survey made some four years ago it was observed that it was the families keeping hens who sustained the pre-war consumption of animal protein in their diet. Egg protein is first class. A hen must pack into the shell the protein needed to make a chick that will nearly fill the shell before it can get to other food. For reasons of space the protein must be first class for the chick, if not for other animals. It's a matter of lebensraum.

We read in *Nutritive Value of Wartime Foods* that 1 oz. of egg supplies 250 i.u. of vitamin A; this is about 500 i.u. per egg. This statement should have been qualified, for even during the war fowls got varying amounts of carotene in their food; it is from this that the hen gets its vitamin A, and one egg may contain six times as much vitamin A as another. Almost all the vitamin A of an egg is actual,

[1] *Observations on Popular Antiquities* by J. Brand. Charles Knight, London, 1841.

[2] *The Papyrus Ebers*, trans. C. P. Bryan. G. Bles, London, 1930.

[3] *Folk Medicine*, Folk Lore Society, London, 1893.

pre-formed vitamin A; β-carotene makes up about 8% only of the carotenoids that colour the yolk and provides no more than 5 i.u. an egg, but the colour of the yolk provides a rough index of the amount of vitamin in it. Eggs are also one of the few foodstuffs that provide appreciable amounts of vitamin D—about 60 i.u. an egg, which contains also about 0.3 mg. of riboflavine, or one-sixth of our average daily intake. In egg white the protein avidin combines with the vitamin biotin and prevents its absorption, and rats fed on a diet of egg white develop a characteristic dermatitis. A man who lived mainly on six dozen raw eggs a week got a scaly dermatitis, and a similar dermatitis has been produced by feeding people with large amounts of egg white. But there is no risk of biotin deficiency in anyone taking a normal diet, however many eggs are eaten.

Eggs have no ascorbic acid to lose, and the loss of vitamin B_1 in drying appears to be negligible. The physical properties used in cooking may be little changed. The flavours of dried eggs are graded on a scale ranging from "fresh egg flavour, 8," to "inedible, 0." We are told that 75% of people gave a score of 5½ from a sample—between 6 "definite but not unpleasant off flavour," and 5 "unpleasant off flavour"—satisfactory as scrambled egg; and that all domestic eggs now distributed are at least up to this standard. This may well be. But however well the flavour, the nutrients, and physical properties are preserved, dried eggs can never offer the contrasting textures and flavours of whole eggs. Dried eggs smack of utility and austerity.

A laying hen's performance is remarkable. One egg contains as much protein as a pint of human milk, a little less vitamin A, and a little more riboflavine. As converters of the protein of its food to high-class protein for human consumption hens come second only to milch cows, though as converters of calories pigs come first. Hens appear to win as converters of carotene to vitamin A. Cows come first in respect of the B vitamins, for they absorb large quantities of them, manufactured by micro-organisms in the rumen; hens have to depend on what they get in their food as they eat it—a good reason for feeding them with domestic scraps. But the trouble with hens in times of scarcity is that they eat grain that might be eaten by human beings and give no more than a 12% return as calories. In fact we are told that hens will not be content with whole grain but also need the offals left after milling white flour. We have to choose between 85% extraction flour and few eggs on the one hand, and white flour and abundant eggs on the other.

THE EGG AS POISON

Eggs with their apparently impenetrable shells seem to offer us a food safe from the risk of conveying bacterial infection, and were long so regarded. When the Three Musketeers of Dumas feared being poisoned they resorted to boiled eggs as above suspicion. It has long been known that this safety is only comparative, since egg shells are not impervious to bacteria, while some birds get behind our defences by depositing from the oviduct pathogenic bacteria directly in the egg yolk. Many investigations have shown that ducks may suffer from epidemics of Salmonella infections due to strains, such as *S. enteritidis* and *S. typhimurium*, which are responsible for outbreaks of food poisoning in man. Certain varieties of ducks are more prone to these infections than others. The infected ducks may transmit the living bacilli into the egg yolk. In other cases the egg may be infected by pathogenic bacilli passing through the egg shell from outside. Egg shells are porous in the strict sense that they have pores, and many workers have proved the passage through the porous egg shell of bacteria from liquids in which the eggs are soaked. Infected duck flocks have been most frequently met with in Holland and Germany, but they also occur in Great Britain.

Many outbreaks of food poisoning have been shown to be due to the consumption of infected ducks' eggs. Two recent cases are those recorded by R. F. Gordon and A. Buxton,[1] and by E. H. Gillespie.[2] Much has been done to reduce flock infections by blood agglutination tests, segregation, and the examination of eggs. Hens also may suffer from Salmonella infections, but the strains responsible have hitherto been always of *S. pullorum*, a type not pathogenic to man. Unfortunately other strains have recently been encountered. R. F. Gordon and A. Buxton[3] isolated *S. thompson* during 1943 and 1944 on 44 occasions from 31 outbreaks in chicks and 2 in ducklings. The organism was not isolated from the eggs themselves. This strain is one which can cause human food poisoning. These findings are in conformity with the fact that at least two food poisoning outbreaks have been ascribed to the egg of the hen, and probably others will occur. They are, however, of extreme rarity, and we may regard the unopened egg of the hen as almost completely safe from being a vehicle for the transmission of disease.

Dried egg powder in tins, now so extensively used to supplement our food supply, is a different matter, and there have been a number of outbreaks of food poisoning from this source. Many investigations have been made into its Salmonella content. For example, N. E. Gibbons and R. L. Moore,[4] examining Canadian egg powder, found Salmonella strains in 28 samples (7.4%), and all but 5 (*S. pullorum*) were potentially pathogenic to man. M. D. Schneider[5] examined 901 samples of high-quality powdered egg used by the U.S.A. armed Forces, and from 32 (3.2%) isolated Salmonella organisms, including several strains known to be pathogenic to man. As a means of reducing the Salmonella infection the same author subsequently[6] showed the value of pre-heating the liquid egg at 141°–143° F. for six minutes before spraying.

M. Solowey, E. H. Spaulding, and H. E. Goresline[7] have recently thrown much light upon sources of infection of the egg powder and suggested lines along which a reduction can be obtained. Salmonella organisms were recovered from the shell surfaces of 1% of clean intact shell eggs, from 5% of similar but dirty eggs, and from 5% of "washed-dirty" shell eggs. The same kind of

[1] *Mon. Bull. Emerg. Pub. Hlth. Lab. Serv.* 1945, **4**, 46.
[2] Ibid., 1946, **5**, 157.
[3] *J. Hyg., Camb.*, 1945, **44**, 179.
[4] *Canad. J. Res. F.*, 1944, **22**, 48.
[5] *Food Res.*, 1946, **11**, 313.
[6] Ibid., 1946, **11**, 521.
[7] Ibid., 1946, **11**, 380.

results were obtained when liquid whole-egg mixtures were examined, prepared respectively from the three different grades of eggs. The Salmonella strains isolated included many strains known as food-poisoning organisms. These results show that the external shell surface is an important source of Salmonella contamination and that dirty eggs are the primary offenders. They also suggest that washing dirty eggs by first soaking in a hypochlorite solution, followed by brushing and water rinsings, is unsatisfactory as a means of removing harmful bacteria. Soaking increases the probability of shell penetration, and subsequent brushing tends to force the organisms into or through the shell pores. Other preventive measures, in addition to using only clean eggs and pre-heating, are the avoidance of delay in tanks of the egg mixture and using correct temperatures of holding. As dried egg powder is likely to become a standardized food it is important that steps should be taken to safeguard its purity. The setting up, and enforcement, of suitable bacterial standards should be considered, and this should not be a difficult matter.

NEW PATHS IN ANAESTHESIA

The conditions in which the art of anaesthesia is carried on in Great Britain are noteworthy. The practice of anaesthesia is restricted to medical practitioners; moreover, they are given the dignity and privilege of being treated as specialists. The wisdom of this course, carried out in the face of opposition, moribund but not yet dead, is apparent from the advances made in this country and the general ferment of inquiry evident in the ranks of anaesthetists. This is in happy contrast to the sad state of anaesthesia on the Continent. This spirit of inquiry is evidenced by the articles published in this issue of the *Journal* on anaesthesia and the relief of pain.

Curare is a word already bandied about by medical students at their finals—a good enough indication that it is a part of everyday medicine and that it has come to stay. The story of its application to clinical anaesthesia exemplifies the old advice to respect the opinion of others while reserving one's own. From the time of Aesculapius to the present day a "big" name over an opinion has often tended to stifle criticism and investigation, sometimes, as history shows, for hundreds of years. Most pharmacologists placed stringent prohibitions on the administration of curare to human beings, and had they been allowed the last word one of the great advances of clinical anaesthesia might have been held back; for example, it was stated in a standard textbook of pharmacology that "the therapeutic use of curare . . . has not been encouraged . . . because of its tendency to paralyse striated muscle." Two articles in this week's issue describe the use of tubocurarine to "soften" therapeutic electric convulsions. They confirm the results of Bennett,[1] who not only put "curare" on the clinical map by using it in such cases but suggested its application to anaesthesia, a still more useful field. It was originally advised that while the curare is slowly injected the patient should be asked to perform some simple movement, like snapping his fingers. When he can no longer do this easily muscular power is waning, and the convulsion can be induced without violent response. It would probably be difficult to improve on such a simple biological test of dosage. Under the cushioning influence of tubocurarine convulsion fractures are almost unknown, while much of the terrifying aspect of the patient under electro-convulsive treatment is removed, to the benefit of impressionable nurses and orderlies.

The application of tubocurarine to caesarean section is new in this country, although reports of its successful use have come from America. No one would underestimate the gravity of delivering a curarized infant and the problem presented by an apnoeic baby whose lungs, never having expanded, could not be inflated. Such fears cannot be dismissed by one enthusiastic paper. Foetal curarization must depend upon the dose injected into the mother. This in turn is a function of the relaxation required by the surgeon, his operating time, and, not least important, the type of operation—classical or lower segment. What is satisfactory for a lightning operator doing a classical operation may be disastrous for the slower man on a lower segment operation. This is one of the points which emerged clearly from the discussion at the Royal Society of Medicine, reported elsewhere in this issue. All these and other factors must be carefully considered before tubocurarine is advocated as a good adjunct of anaesthesia for caesarean section. In any case, proof would have to be forthcoming not only that tubocurarine is safe for mother and child but that it is safer than, for example, spinal anaesthesia or cyclopropane. The question of the transmission of tubocurarine across the placenta ought to have been settled by animal experiments, but no such experiments are on record. Caution is necessary lest what is old and well tried is jettisoned for something new—just because it is new.

Tubocurarine is a powerful drug. Its most dramatic effects are seen in the vigorous patient, so often a real anaesthetic problem in abdominal surgery, for whom otherwise nothing short of spinal anaesthesia suffices. Tubocurarine has earned its fame by the way it subdues the robust. It is therefore all the more interesting to read of its selective use in poor-risk patients. It may be that in skilled hands and with careful dosage a little tubocurarine may do less harm to such a patient than the little extra amount of a general anaesthetic which would have been needed for the same effect. Nevertheless, the fact will need widespread confirmation before general acceptance. Ill patients, particularly those with abdominal emergencies, often have liver and kidney damage. Any drug must be given cautiously, for excretion is delayed. Already one death has been recorded when tubocurarine was used in a poor-risk case.

Caesarean section and the poor-risk case perhaps represent two of the spots in this new path in anaesthesia which are not quite ready for the heavy traffic of daily routine. Experience will no doubt show others. It is to be hoped they will be well marked for the unwary.

[1] *J. Amer. med. Ass.*, 1940, **114**, 322.

PROGNOSIS IN ACUTE NEPHRITIS

Satisfactory criteria for prognosis in acute nephritis are difficult to obtain. Cure rates of from 38 to 100% have been reported. The different systems of classification, together with the failure to recognize continued kidney damage when the patient is clinically recovered in the "latent state," may account for the discrepancies between various authorities. Snoke[1 2] has drawn attention to this and to the geographical differences in prognosis reported from the Pacific and Atlantic coasts of the United States. The prognosis of war nephritis, the nephritis of children, and post-scarlatinal nephritis may well vary from that of acute nephritis following infections such as tonsillitis. In selecting

[1] *Amer. J. Dis. Child.*, 1937, **53**, 673.
[2] Ibid., 1939, **57**, 1373.

cases for follow-up investigations great care must be exercised not to include cases of chronic nephritis with no previous history of acute attack. The whole study of the prognosis after acute nephritis has been hampered by the lack of an agreed procedure for estimating the state of the lesion in the latent symptomless period.

Rudebeck[3] has used the quantitative estimation of the urinary sediment introduced by Addis[4] in 1925, in conjunction with albumin estimation and measurement of the blood pressure and the concentrating powers of the kidney, in his re-examination of cases at the Lund Medical Clinic. In order to free himself from the welter of contradictory material in the literature, he collected from the records of the clinic (1910–39) only those cases which satisfied the following conditions: (*a*) unquestionable acute nephritis after the age of 10; (*b*) definite post-infectious onset, excluding specific fevers; and (*c*) no previous renal disease until three months in most cases, or three years at the longest, before admission to hospital. The material thus obtained was considered to be homogeneous and representative of post-infective acute nephritis in the adult. The criteria for recovery finally adopted were: (*a*) normal blood pressure; (*b*) urine albumin-free; (*c*) an Addis sediment count not exceeding one million red cells per 12 hours; and (*d*) duration of these negative findings for one year. The figures given for the 318 patients investigated in the follow-up agree well with the majority of previous statistics. Deaths were 6.6% of the total cases. Some 50 patients were not traced. Of the remainder—245 cases—69.4% recovered, 11.0% did not, and 19.6% were labelled uncertain. The interest of the investigation, however, lies in the attempt to estimate the effects of various factors on the prognosis. Rudebeck insists that the results must be evaluated cautiously, despite stringent precautions taken to allow for sources of error.

Payne and Illingworth's[5] views on focal nephritis were borne out. Many patients behaving as cases of focal nephritis progressed to a chronic state. There was no evidence that the severity of the attack influenced the long-term prognosis. The risk of death in the acute stage was much increased when almost complete anuria or heavy albuminuria was seen, but the degree of the hypertension, haematuria, and oedema could not be shown to have any prognostic significance. Osman[6] believed that recurrent acute attacks of nephritis did not prejudice the recovery rate, and 40 such cases were analysed by Rudebeck. He too found it impossible statistically to prove a bad prognosis in these cases. Pregnancy was demonstrated to have no effect in flaring up a past nephritis, thus agreeing with Wellen, Welsh, and Taylor,[7] who found that the kidney function was unchanged in two chronic nephritics who went to term. Analysis of the effect of rest in bed showed that patients who were going to progress to chronic nephritis did so whether they were confined to bed early or not, and it could not be proved that the prognosis was any better if the patient was kept at rest for long periods. There was agreement with the view of Addis[8] that the fate of the kidney is decided when infection occurs, and that treatment has little effect on the eventual course. Tonsillectomy could not be shown to have any beneficial effect in these cases.

From this it would seem that a good prognosis may be given in cases which survive the acute manifestations, of whatever severity, and which recover completely, in Rudebeck's sense, before discharge from hospital. The prognosis must be guarded if residual symptoms are present at discharge; and if they persist more than one year, or are severe, chronic nephritis may be confidently awaited. Repeated acute attacks, pregnancy, and tonsillectomy were not shown to alter a prognosis made on these lines.

In the literature on nephritis, as Rudebeck points out, "the distinction between knowledge and belief appears not always to be maintained with sufficient stringency." It is to be hoped that further careful studies of this kind will be made which, if in agreement with each other, will afford a rational basis for estimating the effects of treatment and the ultimate prognosis in acute nephritis.

3 *Acta med. scand. Suppl.*, 1946, No. 173.
4 *J. Amer. med. Ass.*, 1925, **85**, 163.
5 *Quart. J. Med.*, 1940, n.s., **9**, 37.
6 *Guy's Hosp. Rep.*, 1936, **86**, 93.
7 *J. clin. Invest.*, 1944, **23**, 742.
8 *Johns Hopk. Hosp. Bull.*, 1931, **49**, 203, 271.

THE SPLEEN AS AN ENDOCRINE GLAND

In the minds of those who lightheartedly extirpate a damaged spleen there sometimes remains a hazy recollection of five pages of "Samson Wright," in which its functions in blood formation or destruction are described—functions which appear, from the excellent condition of the patients afterwards, to be rather unnecessary. The anaemia which supervenes on splenectomy is transitory, as the red marrow soon takes over. The decreased fragility of the red cells, the neutrophil leucocytosis, and the increase in platelets hardly matter. It is usually forgotten that haemorrhage is less well tolerated and that a general feeling of weakness may persist permanently.

Though a severely damaged spleen must still be sacrificed, the recent work of Ungar[1-4] should introduce a note of regret and doubt into a formerly carefree operation. In 1944 he showed that all the stimuli which inhibit histamine release also reduce the bleeding-time and increase the capillary resistance. The bleeding-time was found to be the most convenient and reliable test of histamine release. It is reduced after tissue injury, and in intact animals by the injection of serum from damaged animals, corticotrophic hormone, or adrenal cortical extract. In hypophysectomized animals, however, trauma is ineffective, whereas in adrenalectomized animals trauma, traumatic serum, and corticotrophin are ineffective though cortical extract still works. It appears from this that in intact animals trauma does something to the pituitary which acts on the adrenal cortex and causes it to inhibit histamine release. Ungar has further shown that if the animal has had its spleen removed all these factors are ineffective, but the injection of splenic extract is effective. It therefore appears that the activity of the adrenal cortex in the response of animals to trauma is mediated by way of the spleen. In 1945 he prepared[5] a crude extract of spleen and found that its injection into guinea-pigs in appropriate dosage reduced the bleeding-time. The best effect was produced by a dose of 0.3 mg. of fresh tissue; but with larger doses the effect was less, and when 100 mg. was given the bleeding-time was actually increased. He succeeded in separating the fractions responsible for these opposed results. The increaser of bleeding-time is probably the "thrombocytopen" of Troland and Lee,[6] which is not released as a result of trauma. The decreaser he calls "splenin." It is a crystalline solid of low molecular weight and melting-point which decreases bleeding-time in doses as low as 3×10^{-7} mg./kg., with no reversal at higher dosages. The action of splenin is not inhibited by splenectomy, and its action cannot be imitated by other tissue extracts.

Finding that splenin reduced the bleeding-time, increased capillary resistance, and inhibited the release of histamine from blood cells, Ungar proceeded to investigate its effects

1 *Lancet*, 1943, **1**, 421.
2 *J. Physiol* 1944, **103**, 333.
3 Ibid., 1944, **103**, 18P.
4 *Nature*, 1944, **154**, 736.
5 *Endocrinology* 1945, **37**, 329.
6 *J. Amer. med. Ass.*, 1938, **111**, 221.

on the mechanism which prevents the breakdown of proteins by trypsin and other proteases. Trauma and injection of splenin increase and splenectomy decreases the antitryptic action of serum. It has been known for a long time that the antitryptic action of serum is suppressed by extraction with ether. The aqueous fraction has very slight antitryptic power, and the ether fraction is practically inactive; but when the two are mixed activity is restored. Two substances are obviously required. The water-soluble one is probably antitrypsin, the ether-soluble one an activator. Ungar found that splenin restores the activity of the water-soluble fraction of serum, and the question at once arises whether splenin is the normal activator of the antitrypsin present in the serum.

Several stages of the argument still require confirmation, but it seems probable from these researches that the normal response to injury is somewhat as follows. The pituitary increases its output of corticotrophic hormone; the adrenal cortex is stimulated into increased activity; the spleen is stimulated to increase its output of splenin; the splenin acts as an activator of antitrypsin; the breakdown of proteins is decreased, with a consequent increase in the production of vasodilators such as histamine[7]; and finally the reduction in circulating vasodilator substances decreases the bleeding-time and the capillary permeability. The relationship between these observations and the alarm reaction of Selye[8] and the changes in protein metabolism after injury reported by Cuthbertson[9] and others still need exploration. It seems not improbable that a new window has been opened through which may be viewed from a fresh angle many problems both of surgery and of general medicine.

COLOUR IN FACTORIES

It should scarcely be necessary to argue that the choice of colours both in the decoration of factories and in the painting of factory equipment should be governed mainly by practical considerations related to the particular work to be done rather than by abstract arguments as to the stimulating or depressant effect of specific colours. In a lecture to the Colour Group of the Physical Society in January Mr. H. D. Murray approached this subject from a standpoint which industrial medical officers might well find helpful. The essential physiological requirement, he said, was clear vision of the immediate object of work without the strain which must result from any strong contrast between the intensities of local and of background illumination. This applied to the immediate and to the more distant background. Practical experience had shown that in the working surfaces of machines buff provided a satisfactory background for dull steel; an unsaturated blue for brass; and an unsaturated green or neutral grey for multi-coloured materials, such as might be encountered in textile factories. The general principle was that the immediate background should be of contrasting colour, and of as high saturation as was consistent with the requirements of equal brightness and avoidance of colour adaptation. The choice was naturally easiest when the working colour was the same throughout a complete factory, and most difficult when material of any colour might be worked in any machine. For the wider background provided by walls and ceiling, the chief requirements were that the colour scheme should be "non-distracting," and that the resulting level of brightness should be substantially uniform. Thus, with typical factory lighting, the brightness factor should increase progressively from floor to ceiling, 50% being a suitable value for the upper walls and 75% for the ceiling. There was some advantage in the idea, now fashionable in the United States, of using the colour scheme to emphasize the main structural features and divisions of a factory building. It was important to remember, however, that the main object was to avoid distracting the worker.

Psychological considerations were dismissed as "a convenient justification for a choice for which no immediate reason can be given"; but it was accepted that there are shades of yellow which most people dislike. Tests with factory workers had confirmed also the traditional association of greens and blues with coolness, and of red and cream with warmth. There was justification, therefore, for correlating the colour scheme of a factory with probable temperature conditions. Mr. Murray made a further concession to the psychological school in reporting that complaints of excessive coldness in a canteen had ceased in one instance, within his own knowledge, after the colour scheme but not the heating arrangements had been altered. If practical experiments were undertaken to assess the popularity of different colour-combinations, it should be remembered that "low interest-value" was for this purpose an advantage. To annoy no one was a more desirable objective than to please, and possibly to distract, a few and, at the same time, to annoy, and probably also to distract, many others. Finally, for anyone interested in achieving the latter result, it seems that a particular shade of crimson may be commended as a foundation.

CEREBRAL PALSY UNIT

The cerebral palsy unit set up by the London County Council in 1943 at Queen Mary's Hospital for Children at Carshalton has been treating an average of fourteen children at a time. It is now proposed to enlarge it to take twenty at a time, and later forty, and later still sixty, by which time it is estimated that between 120 and 150 children will be undergoing treatment each year. A report by the Hospitals and Medical Services Committee of the L.C.C. makes it clear that this unit, the first to be established in the British Isles, has shown that the treatment of selected cases of cerebral palsy by the methods demonstrated by Prof. Phelps, of Baltimore, gives good results. Some hopelessly crippled children have been transformed into individuals capable of taking part in the life of at least a school for physically defective children, and in many instances in normal school life.

It is considered desirable to continue with the special methods of treatment now being carried on and to develop the existing facilities as speedily as possible. The Ministries of Health and of Education both want to develop cerebral palsy work, and the latter Ministry has appointed a technical adviser who has been to America to study the methods employed there and the results achieved. A close association has been arranged between the L.C.C. and those responsible for a new school for children suffering from cerebral palsy. This is being established at Croydon by a voluntary organization. In the Carshalton unit the staff is to include a cerebral palsy therapist and an assistant, an occupational therapist, and a speech therapist (half-time). The part-time consultants and specialists concerned will be paid, the physician at the rate of £250 a year for one session a week, and the orthopaedic surgeon at £5 5s. a session.

Edward Joseph Conway, D.Sc., M.B., B.Ch., professor of biochemistry and pharmacology at University College, Dublin, and Geoffrey Jefferson, C.B.E., M.S., F.R.C.S., professor of neurosurgery in the University of Manchester, were elected Fellows of the Royal Society on March 20.

[7] Macfarlane R. G., *Quart. J. Med.*, 1941, **34**, 1.
[8] *Endocrinology*, 1937, **21**, 169.
[9] *Biochem. J.*, 1929, **23**, 1328.

THE INTERNATIONAL SYSTEM OF WEIGHTS AND MEASURES

BY

J. M. HAMILL, M.D., D.Sc.

Nearly a century and a half has elapsed since the International System of Weights and Measures was first inaugurated. It is also known as the metric system, because it was based on the metre, but, as will be seen later, this is no longer a correct description on account of modifications which the system has undergone since its inception. After the French Revolution the French Government decided that a rational scientific system of weights and measures which could be used internationally for all purposes was urgently necessary. Accordingly they convened a Commission of representatives of different countries, who in 1799 formulated the international system of weights and measures, or the metric system as it could then quite properly be called. The objects of the Commission were to lay down standards of length, volume, and mass* which should be interrelated and which should be based upon a natural invariable quantity independent of any arbitrary material standard. They chose as their natural quantity a unit of length which was presumed to be the one-ten-millionth part of the polar quadrant of the earth which passes through Paris. This unit of length was called the metre, and was given material expression in the form of a bar of platinum the distance between whose ends was exactly a metre. This material metre was called the "*mètre des archives*" and remained the standard until 1889. In point of fact the length of the polar quadrant was not exactly known, and the difficulty of repeating the determination of the value of the standard by reference to the definition was so great that it became necessary to legalize the length of the *mètre des archives* as defining the unit, so that actually the standard of length became a material one and not a natural invariable standard as was originally intended.

The standard of volume—the litre—was derived from the standard of length—the metre—or rather from the first submultiple of it—the decimetre. The litre was defined as the volume of a cube each of whose sides measured one decimetre. Since a cubic decimetre contains 1,000 cubic centimetres, the cubic centimetre became the term of description for the one-thousandth part of a litre and so remained for just over 100 years, until, as will be seen later, the litre was redefined and the cubic centimetre ceased to have any derivative connexion or relationship with the litre.

The standard of mass—the kilogram—was derived from the cubic decimetre. The kilogram was defined as the mass of a quantity of water occupying the volume of one cubic decimetre at the temperature of maximum density (4° C.). The material representation of this natural standard was a cylindrical piece of platinum, which was designated the "*kilogramme des archives*" and remained as the standard until 1889. It should be noted that the standard of mass is the kilogram and not the gramme.

The International Commission in 1799 also arranged that multiples and submultiples of the standards of length, volume, and mass should bear a decimal relationship to their respective standards in conformity with the decimal scale of numerical notation.

Reconsideration of Standards

The position remained much as stated above during the first three-quarters of the nineteenth century. During this period the rapid development of science and technology made accurate measurements imperative, and a reconsideration of the international (metric) standards of measurement became urgent. Accordingly preliminary conferences with representatives of about thirty nations were held, and in 1875 representatives of seventeen countries subscribed to a treaty called the Convention du Mètre, by which an international organization was formed to deal with all questions relating to standards in the international system of weights and measures. Ultimately thirty-two nations became members of the organization. The organization consists of an international authority—the Conférence Générale des Poids et Mesures—the members of which are accredited delegates of each of the thirty-two nations who joined the organization. This Conference meets normally every six years. They appoint the Comité International des Poids et Mesures, which is an executive body of eighteen members to manage the affairs of the Bureau International des Poids et Mesures between the meetings of the Conférence Générale. This Committee meets every two years, and makes representations to the General Conference or acts on authority delegated to it by the Conference. The Bureau International des Poids et Mesures is the headquarters of the organization, and is situated at Sèvres on a site which has been declared neutral territory and has been ceded by the French Government to the Conférence Générale.

The Bureau International after its formation soon came to the conclusion that the existing standards, the original standards of the archives, were capable of improvement, and it was decided to supersede them by new standards. Accordingly in 1889 the *mètre des archives* was replaced by the existing standard, which is known as the "prototype metre." This was made as nearly as possible the same length as the *mètre des archives*, but it differs in several respects from the old standard. The *mètre des archives* was a simple bar of platinum the distance between whose ends was a metre; such a standard is known as an end-standard. The prototype metre consists of a bar of iridium-platinum alloy (10% iridium and 90% platinum) whose cross-section is X-shaped and near each end on the neutral plane of the bar is ruled a fine transverse line; the distance between these two lines is a metre. Such a standard is called a line-standard. Technical improvements during the nineteenth century made it possible to rule such lines with great accuracy, so that line-standards could be made much more accurately than end-standards. When the *mètre des archives* was made in 1799 the reverse was the case; line-standards could not then be made so accurately as end-standards. But the matter does not rest there. It is now possible to make end-standards having flat parallel terminal faces with a mirror-like finish of optical perfection so that by interferometric methods the length of the metre can be measured to a degree of accuracy of a wave-length of light. It is, indeed, possible to return to the 1799 Commission's ideal of a natural standard and to express the metre in terms of the wave-length of, say, the red line in the cadmium spectrum or perhaps the even more monochromatic light of an isotope of mercury. For the present, however, the prototype metre—a line-standard—remains the standard in the international system of weights and measures.

Accurate copies of the prototype metre were made and were distributed among the nations who were members of the Conférence Générale. The British copy is No. 16, and it is now preserved at the National Physical Laboratory, Teddington. It is the legal standard metre in this country. †

An extremely important change was the redefinition of the kilogram. It had long been realized that masses could be compared with a higher degree of accuracy than volumes could be determined, and the original definition of the kilogram was abandoned because doubt had arisen whether the *kilogramme des archives* did conform precisely to that definition. It was obviously preferable to have a material standard of mass specifically defined rather than one defined from the unit of length through the unit of volume. Accordingly in 1889 the International Bureau constructed a new kilogram which consists of a cylinder of the same iridium-platinum alloy as that of the prototype metre, having a mass as nearly as possible equal to the *kilogramme des archives*. This new standard superseded the kilogram of the archives and is known as the "prototype kilogram"; it is the standard kilogram at the present time. It should be emphasized that the prototype kilogram is an entirely independent standard no longer linked with the metre and consequently completely divorced from the metric system.

About forty accurate copies of the prototype kilogram were made and distributed to the countries which were members of the Conférence Générale. The British copy is No. 18 and it

*Mass is the quantity of matter in a body. Weight is a force expressed as the product of the mass multiplied by the acceleration due to gravity. This latter differs at different places on the earth, and consequently the weight of a body at these places differs accordingly.

† Weights and Measures (Metric System) Act, 1897.

kept in a specially constructed metal container at the National Physical Laboratory, Teddington. It is the legal standard kilogram for this country.†

Cubic Centimetre versus Millilitre

The next step taken by the International Bureau was the redefinition of the unit of volume, the litre. In 1902 the litre was defined as the volume occupied by a mass of one kilogram of water at the temperature of its maximum density (4° C.) and under a pressure of one atmosphere. Since it has been redefined on a basis of the prototype kilogram it follows that the litre, like the kilogram, has been divorced from the metric system; it has now no connexion whatever with the metre. This fundamental change in definition of the litre has the effect of excluding the cubic centimetre from any derivative relationship with the litre. The thousandth part of a litre is now a millilitre and not, as originally, a cubic centimetre. The cubic centimetre should therefore never be used as an alternative to the millilitre. Although the cubic centimetre has now no derivative relationship with the litre or millilitre it is desirable to know what is the volume relationship between the litre and the cubic centimetre. This, of course, could be decided only by experiment. In 1910 the International Bureau determined this volume relationship and found that the litre as newly defined was slightly larger than the litre of the archives. Actually it was found that a litre is equal in volume to 1,000.027 cubic centimetres; other determinations give a value of 1,000.028 cubic centimetres. That the litre so closely approximates to the cubic decimetre is evidence of the skill with which the *kilogramme des archives* was constructed nearly 150 years ago.

When it is desired to convert millilitres into cubic centimetres the conversion factor will clearly be 1.000027, and conversely when cubic centimetres are to be converted into millilitres the conversion factor will be the reciprocal of 1.000027. This conversion factor is necessary only for work requiring extreme accuracy; for all ordinary medical purposes, the conversion factor may be taken as unity. The simplicity of this conversion does not, of course, justify the use of the cubic centimetre as an alternative to the millilitre. Apart from the small but real difference in volume between the two, the fundamental reason why the cubic centimetre should not be used as an alternative to the millilitre is the fact that there is no connexion whatever between these two units. The only occasion on which the cubic centimetre can properly be used as a measure of volume is when the volume has been determined from linear measurements. It must be emphasized that the cube of a unit of linear measure as a mode of expressing volume has no derivative or cognate connexion with the litre or any of its aliquot parts.

It is sad to reflect that, although nearly half a century has elapsed since the litre was redefined, many people, including regrettably a significant proportion of the medical profession, continue incorrectly to use the cubic centimetre as an alternative to the millilitre. The international system has been legalized in this country, and the denominations of the Board of Trade standards of weight and measure which may legally be used are given in the Weights and Measures Regulations, 1907, made by the Board of Trade under the authority of the Weights and Measures Act, 1904. The litre and the millilitre have been legalized, but the cubic centimetre has not been legalized as a submultiple of the litre.

The *British Pharmacopoeia*, 1932, page 639, follows the legal definitions and recognizes only the litre and the millilitre. The Ministry of Health correctly uses the millilitre in the Milk (Special Designations) Order, but in the Therapeutic Substances Regulations, 1927, the cubic centimetre is used throughout instead of the correct millilitre. In Article 2 (2) of the Regulations it is stated, oddly enough, that the millilitre may be used wherever the cubic centimetre is indicated; in other words, permission is given to use the correct unit instead of the incorrect one adopted in the Regulations. The *British Medical Journal* has rightly insisted on the correct nomenclature in its articles, and it is to be hoped that other journals which have not yet done so will take similar action. Scientific workers in general have adopted the correct nomenclature, and all scientific glassware made in Britain is now graduated and marked in millilitres, not in cubic centimetres. A curious exception is the marking of hypodermic syringes in cubic centimetres. Clinicians should not lag behind the rest of the scientific world but should arrange with manufacturers to mark syringes in millilitres. Until this is done they should convert their readings into millilitres, using unity as the conversion factor. To record their readings in cubic centimetres suggests ignorance.

† Weights and Measures (Metric System) Act, 1897.

No Longer a Metric System

It should be clear from the foregoing why the international system of weights and measures can no longer be correctly described as a metric system. The only part of the metric system which remains is the unit of length—the metre—with its multiples and submultiples, and the squares of these to measure area, and their cubes to measure volume when this is determined from linear measurements. The unit of mass—the kilogram—and the unit of volume—the litre—have been irrevocably divorced from any connexion with the metre. Metrologists cannot evade the logic of this conclusion, but some of them would fain continue to use the description "metric" mainly as a tribute to the origins of the system. When it is remembered that the metric ideal could not be accurately realized and that one of the ideals of the founders of the system was internationality, sentiment should be satisfied by the retention of this latter aspiration in the description "international system." The metric ideal has been shattered by the redefinition of the kilogram and the litre, but the ideal of internationality remains unshaken. It would seem, therefore, on grounds both of logic and of sentiment, that the proper description is the "International System of Weights and Measures."

It is interesting to note that there is a close parallel between the kilogram, the litre, and the cubic centimetre and the British weights and measures—the pound, the gallon, and the cubic inch. The pound, like the kilogram, is an independent material standard of mass; the gallon, like the litre, is a measure of volume based upon the standard of mass—one gallon is the volume of ten pounds of water. The cubic inch, like the cubic centimetre, is a measure of volume when this has been determined from linear measurements—i.e., inches. The volume relationship between the gallon and the cubic inch, like that between the litre and the cubic centimetre, has been determined experimentally—one gallon equals 277.4 cubic inches approximately.

The Question of Spelling

Finally there is the question of spelling, in which there is still a good deal of confusion. The French spelling of kilogramme, gramme, and milligramme is used in certificates issued by the National Physical Laboratory. Certain scientific societies use the English spelling, in which the final two letters, "me," are omitted. The *British Pharmacopoeia*, 1932, uses a mixed spelling—namely, kilogram, gramme, and milligram. The *Pharmacopoeia* is strictly correct in this usage, because this is the legal spelling as set out in the Weights and Measures Regulations mentioned above. This spelling was imported into the Regulations from the Weights and Measures Act, 1878, and the same spelling occurred in the Weights and Measures (Metric System) Act, 1864. The reason for its adoption in this Act is not known. From the point of view of the *Pharmacopoeia* the spelling "gramme" is fortunate, because it is less likely than is "gram" to be confused with "grain," especially when a writer omits to dot the "i" in "grain." There is much to be said for uniformity in spelling, and if a uniform practice is adopted it should be the legal one used in the statutory regulations of the Board of Trade.

The Manchester Dental Hospital and Turner Dental School, aided by a grant of £30,000 from the trustees of the Nuffield Foundation, will undertake research into the causes of dental disease. Dr. Matthews has been appointed to the Chair of Prosthetic Dentistry and Dr. Holt to a readership in operative dentistry. The children's clinic at the hospital, by arrangement with the Manchester Education Committee, will take over the dental welfare of some 1,200 children attending three schools in the neighbourhood. It is expected that the research will continue for ten years.

MOBILE PHYSIOTHERAPY SERVICE IN LIVERPOOL

In an address to the council of the Greater London Provident Scheme for District Nursing Mr. H. C. R. Formby, secretary of the Liverpool "Queen's Nurses" Association, described a mobile physiotherapy service which was started by voluntary effort a year ago. Three units in Liverpool, he said, were now working an average of 44 hours a week each, and each was paying eight visits a day; last year they treated nearly 300 cases (3,560 treatments), nearly all of which had been referred by general practitioners. The object was to provide domiciliary massage treatment for patients unable to attend hospital. Until the introduction of this service under the auspices of the District Nursing Association ambulances and wheeled chairs had had to be used, with consequent delay as well as wastage of manpower. No difficulties were encountered in electricity supply; the apparatus was fitted with adaptable plugs, and for some treatments a portable battery was carried.

In Liverpool they had been fortunate enough to obtain their vans free of cost, and had had to pay only £200 for the conversion of each vehicle. Civil Defence and Red Cross vehicles were still available and suitable for conversion; otherwise, if new vehicles were purchased, the total cost was £500 for each outfit. Running costs were higher in rural than in built-up areas, and the aim in rural areas should be to base the unit as nearly as possible in the centre of the district. The maximum fee charged to the patient was 7s. 6d. for each visit, 5s. for those who could not afford to pay the full amount, and necessitous cases were attended free of charge, the cost being met out of public assistance funds. The physiotherapists, who of course worked under the instructions of medical practitioners, were not responsible for the upkeep of their vehicles or for the details of administration. Mr. Formby said that in his view mobile physiotherapy should be linked with district nursing throughout the country. A committee, to which the Chartered Society of Physiotherapists had appointed representatives, had been set up under the chairmanship of Lord Horder, one of the first objects of which was to raise the necessary funds for areas which could not afford to launch mobile physiotherapy units without aid.

NUFFIELD FOUNDATION FELLOWSHIPS

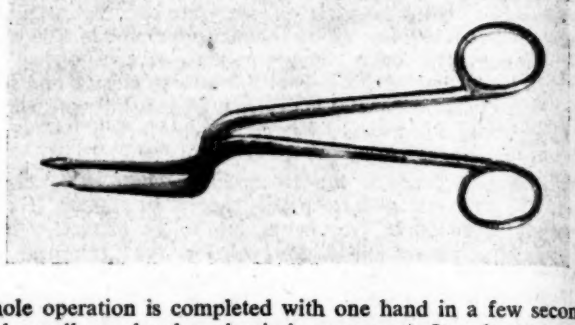
The Nuffield Foundation is prepared to award a few Fellowships to enable some suitably qualified medical men and women to obtain advanced training in the cause, prevention, and cure of chronic rheumatism. As far as possible, the amount of any award and the conditions attached to it will be adapted to the need of the recipient having regard to the purpose for which these Fellowships are offered. Normally the annual value of a Fellowship will be between £500 and £800. In the event of a Fellow being required to travel abroad to obtain special experience or study facilities, the Foundation will pay the travelling expenses involved in addition to the award. Fellowships will be awarded for one year, but may be renewed for a second year, and are open to men or women who are British subjects holding a medical qualification registrable in the United Kingdom, and who are normally resident there and who desire to specialize in the diagnosis, treatment, and study of chronic rheumatism. Candidates must have spent at least one year since qualification in the general medical practice of a hospital, and preferably should hold the M.R.C.P. diploma. A Fellow may not hold any other award concurrently with the Fellowship without the permission of the trustees of the Foundation. Fellows will be required to carry out, at institutions approved by the trustees of the Foundation, a programme of work and training similarly approved. Other work, paid or unpaid, may not be undertaken without the permission of the trustees. A Fellow will be required to submit to the trustees, at the end of each year's tenure of his Fellowship, a report on his or her work during that year. Should the trustees at any time find that a Fellow neglects or has neglected the obligations of his appointment, they shall have power immediately to terminate his Fellowship. The Foundation is prepared to receive applications at any time. Medical officers at present serving with the armed or auxiliary Forces of the Crown may apply for Fellowships tenable on their release from such Forces. Forms of application are obtainable from the Secretary, Nuffield Foundation, 12 and 13, Mecklenburgh Square, London, W.C.1.

Preparations and Appliances

CUTTING PUNCH BIOPSY FORCEPS

Dr. J. WALTER, Deputy Medical Director, Sheffield National Centre for Radiotherapy, writes: This instrument was designed for speed in taking biopsy specimens from surface lesions, particularly neoplasms. It is essentially a modification of the ordinary punch forceps with the following differences: (1) The lower half ends in a lancet point with sharp tip and cutting edges; the blade approximates a scalpel in thickness. (2) The upper half corresponds in shape, but is a "ring" allowing the lower blade to sink into it, to produce a shearing action. The lower edges of the upper ring are sharpened to produce the cleanest possible shear.

To illustrate its action on, say, a skin epithelioma: the lower cutting blade is pushed in deep to the growing edge, to the desired depth and distance, and the upper ring is brought down scissors-fashion, shearing off the piece of tissue above the cutting blade, and the specimen is lifted cleanly away. The



whole operation is completed with one hand in a few seconds, and usually no local analgesia is necessary. Its advantages are marked, as compared with the ordinary two-handed method with scalpel and dissecting forceps. (*a*) There is no danger of missing the selected fragment, or of macerating it by repeated incision and manipulation. (*b*) Bleeding cannot interfere with the speed and success of the operation once the blade is correctly inserted. (*c*) An adequate depth of tissue, suitable for a definite histological opinion as to invasion of corium, is more likely to be secured than by the ordinary method. (*d*) The speed and ease of the operation make it particularly valuable in a busy out-patient department, where routine biopsies would otherwise be impracticable. (*e*) A wider field of biopsies is opened up, for example, from the pharynx, back of tongue, vagina, where time-consuming methods are generally needed. It is particularly useful inside the mouth.

Experience over two years in a busy department has demonstrated its value. The edges can be sharpened as necessary, and sterilization secured by immersion in lysol instead of boiling.

The instrument was manufactured by Messrs. Wm. Skidmore and Co., Ltd., 59, Cemetery Road, Sheffield, 11. A fuller description has appeared in the *British Journal of Radiology*, May, 1946, and I am indebted to the Hon. Editors for permission to make use of the material previously published.

La Ligue Internationale Contre le Rhumatisme has now been reconstituted under the presidency of Dr. Ralph Pemberton, of Philadelphia, and subdivided into a European "Ligue" and an American "Ligue." The British branch will be represented by the scientific advisory committee of the Empire Rheumatism Council with the following officers: *Chairman and National Representative*, Dr. W. S. C. Copeman; *Treasurer*, Dr. G. D. Kersley; *Secretary*, Dr. Oswald Savage. A European congress has been arranged in Copenhagen for September this year and an international congress in the United States for 1949. As far as possible all old members and others who may be interested have been circulated, but the Ligue is anxious to enrol any medical men concerned in the problem of rheumatism. Further details will be sent on application to the organizing secretary, Empire Rheumatism Council, Tavistock House (North), Tavistock Square, London, W.C.1.

Reports of Societies

ANAESTHESIA FOR CAESAREAN SECTION

A discussion on anaesthesia for caesarean section took place at a meeting of the Section of Obstetrics and Gynaecology of the Royal Society of Medicine on March 21. The subject excited unusual interest; the seating accommodation in the Barnes Hall was extended to capacity, and over 100 members stood throughout the proceedings. The chair was taken by Mr. WILLIAM GILLIATT.

Spinal Anaesthesia

Mr. RUFUS THOMAS said that the criteria in anaesthesia for caesarean section must be primarily the safety of the mother and child and, subject to this, ease of operating for the surgeon. Nearly all his caesarean sections for nine years had been done under spinal anaesthesia with "nupercaine." He admitted that spinal anaesthesia was not suitable for any and every woman. It was said that the pregnant woman at or near term was susceptible to the influence of cocaine products; "nupercaine," however, was a quinoline product not related to cocaine compounds. It was also said that collapse and death were liable to occur from a sudden drop in blood pressure. This might be so if proper precautions were not taken; it was a danger to be avoided, first by giving a vasopressor before the injection, by having the blood pressure recorded at five-minute intervals throughout the operation, with injection of a vasopressor if the systolic pressure dropped below 90 mm. Hg, and finally by the elementary precaution of not using spinal anaesthesia in unsuitable cases. It was dangerous to use it in severe anaemia or low blood pressure unless and until the patient's condition could be restored by blood transfusion.

With these precautions spinal anaesthesia was safe and easy to administer. The difficult cases were those with spinal abnormalities. The patient herself felt nothing after the initial prick of the needle. She was, of course, conscious. She heard the baby cry at birth, she could be told its sex, could see the baby herself if she desired, and could see her husband at once. The anaesthetic had no effect on the baby. He had heard many infants cry lustily before being delivered from the uterus. The surgeon, moreover, had the maximum of operative comfort. The muscles were relaxed, the abdomen quiet, and access to the lower segment was greatly facilitated. Some operations were almost bloodless. The placenta often delivered itself, and closure of the uterine and abdominal incisions was very easy. After operation vomiting and distension were rare and chest complications practically non-existent. He was able to speak of 346 caesarean sections under "nupercaine." There had not been a maternal death under or due to the anaesthetic. The number of infants delivered (including four sets of twins) was 350, of which 2 were stillborn and 10 died later, an infant salvage rate of 96.5%. The chief indication for operation was disproportion, but a "spinal" had been used in practically all the recognized indications for caesarean section, including a number of cases complicated by ovarian cysts and 58 cases of placenta praevia. Caesarean section under spinal anaesthesia was carried out twice for 41 patients and three times for 5.

Caudal Anaesthesia

Mr. J. H. PEEL reported a small series of cases in which caesarean section had been carried out under caudal anaesthesia. He could not claim that this was a perfect method, but it was a valuable addition to the anaesthetist's technique, giving a systematic and unhurried approach to the lower uterine segment. The dangers of ether, chloroform, and "pentothal" (thiopentone) in producing foetal narcosis needed no emphasis. There was a growing conviction both in America and in this country that general anaesthesia was not advisable for caesarean section. The Philadelphia General Hospital reported that fewer and fewer women were being subjected to inhalational anaesthesia. He was prepared to admit the advantages of spinal anaesthesia, and some American and British figures were excellent, but it was difficult to rid one's mind of tales of disaster. The caudal approach completely eliminated meningitis and other risks. But it was a method which called for great care and experience if good and certain results were to be obtained by injection into the sacral canal. From 20 to 40 minutes were required from the start of injection until the patient was ready for the surgeon.

He described 50 cases operated on at King's College Hospital, with no maternal mortality and no more morbidity than in caesarean section in general. There were no stillbirths, but there were three neonatal deaths, due to prematurity in one case and to a diabetic condition of the mother in two. Haemorrhage was minimal. The baby cried immediately; there was no narcosis or anoxia. Atelectasis and pneumonia following inhalation of liquor were reduced to a minimum. The Trendelenburg position could be safely used—a small but important advantage. Various methods of premedication had been tried, but patients were far less worried if they had no premedication at all than if they had small doses of drugs which rendered them more excitable. Apart from local abnormalities and difficulties in locating the sacral hiatus, the two most important contraindications were recent haemorrhage and low blood pressure. Patients should be given 1/4 gr. (16 mg.) of morphine as soon as the child was born. The most important drawback to the method was the expertness demanded in administering the injection; nevertheless he urged that it be given a more extensive trial, especially by those who were of opinion that spinal anaesthesia was dangerous for women during pregnancy.

Dangers of Inhalational Anaesthesia

Mr. C. MACINTOSH MARSHALL said that there were several reasons why inhalational anaesthesia must be judged unsatisfactory and even dangerous. Most inhalational anaesthetics induced some degree of anoxia. This was of little importance as a rule, but sometimes as a result of laryngeal spasm or vomiting the anoxic state was quickly reflected in the infant. In addition, many babies came under the influence of the anaesthetic and some resuscitation was required, and occasionally might not be effective. At the same time, in the case of the perfectly sound woman operated on before the onset of labour, these dangers were not likely to arise given an expert anaesthetist; this last qualification was important, because the great majority of anaesthetics for caesarean section were given by the residents in the various hospitals. When, on the other hand, labour had been prolonged, poor uterine action had been a prominent feature, a large amount of sedatives had been used, and extreme moulding was present, the dangers were enhanced and general anaesthesia was absolutely contraindicated. The foetal risk required no emphasis. The only justifiable choice lay between spinal and local anaesthesia. Spinal anaesthesia was almost ideal, but deaths were still reported in literature, and, as he had reason to know, not all the deaths under spinal anaesthesia in caesarean section found their way into the literature. For his own part he had never seen spinal anaesthesia have the slightest adverse effect on the foetus, and no doubt accidents could be avoided, but there were fatal cases.

Local anaesthesia was the method of choice for the intraperitoneal lower segment operation. He hated local anaesthesia—always had hated it—but he had to try to do what he believed was safest for the mother and child, and among the hundreds of contributions that might be written on the subject of that night's discussion he did not believe that there could be one on the dangers of local anaesthesia in caesarean section, because those who used the method would have no cause to make such a contribution and those who had not used it would not have the courage to do so. He pleaded therefore that local anaesthesia should be considered, particularly when it was important to give the premature child every chance of survival. It promised the normal, and therefore the best, oxygen supply in the mother's blood so long as the baby was dependent upon the placental circulation. For many years he had given no pre-operative sedative, but to ameliorate the rigours of the local anaesthetic he had sometimes given a little "pentothal" (thiopentone) just before incision of the uterus. So far he had seen no harm to mother or child.

Experience with Various Methods

Miss KATHARINE LLOYD-WILLIAMS brought forward the records of 305 cases from the Royal Free Hospital. Of these cases 224 related to the pre-war period 1931–9. The anaesthetic procedures adopted had gone through various changing phases, which she described. At one time she gave nitrous oxide and oxygen until the baby was born, then went on to chloroform, and after delivery completed the anaesthesia with gas and oxygen and ether. She stressed the need for complete confidence between the surgeon and the anaesthetist. Later she had tried spinal anaesthesia with results which from the surgeon's point of view were very satisfactory. Spinal anaesthesia became the routine method in her department, using a solution of 1 in 2,000 "nupercaine," preceded by a small dose of "omnopon" and scopolamine and followed post-operatively by paraldehyde. During the war years certain modifications were made; cyclopropane was tried, but was not a popular anaesthetic. She described in detail the present routine method in which thiopentone was used with gas and oxygen. "Omnopon" was given intravenously after delivery, and the operation was completed with a further dose of thiopentone if necessary. She concluded with the observation: "As I grow older I ask myself, before giving an anaesthetic, would I like it myself? So far as concerns spinal and local anaesthesias, which for special cases are admirable, my answer is 'No.'"

Dr. MASSEY DAWKINS said that the question as to which was the best form of anaesthesia for caesarean section must evoke considerable argument, and every known method had its advocates. A search of the literature had brought to light only one large series of cases in which the results were tabulated according to the anaesthetic used—he referred to that published by Irving, of Boston. He went on to give a closely detailed account of the various procedures followed at University College Hospital, including the use of epidural analgesia in caesarean section. Gas and oxygen and ether were most often used. Local anaesthesia had not been entirely successful: only 37% of the patients were able to stand the operation without further anaesthesia. He concluded by saying that he had yet to meet an anaesthetist who would choose to have a spinal anaesthetic for himself, and he added that the anaesthetist had failed in his duty towards his patient if the baby was unable to cry on delivery.

More Advocacy of Spinal Anaesthesia

Dr. J. N. CAVE supported the case for spinal anaesthesia. If an inhalational anaesthetic was used the least amount possible should be given in the shortest possible time before the foetus was delivered. He was convinced that, when there was no contraindication, a spinal anaesthetic gave the greatest chance of a successful delivery with a minimum of risk.

Mr. H. J. MALKIN gave a preliminary communication on experience at Nottingham with spinal anaesthesia in caesarean section. For the last eighteen years he had used spinal anaesthesia almost exclusively for major gynaecological and obstetrical operations. He had particulars of 767 consecutive unselected cases of caesarean section, in 736 of which spinal anaesthesia had been used. There had been 8 maternal deaths, none of which could be said to be due to spinal anaesthesia *per se*. All types of cases appeared in this series, including emergency operations. Mr. COCHRANE mentioned 517 cases in which spinal anaesthesia had been employed. The drug used in the large majority of cases was a procaine derivative. No death was recorded in this series, nor any particular collapse, which suggested that procaine derivatives were not as noxious for the patient as was sometimes supposed. Very small doses were used and gave 40 minutes' operating time.

Mr. J. A. STALLWORTHY complained that speakers had not differentiated between the lower segment and the classical operation. These constituted completely different entities. Nobody had mentioned the danger of asphyxia of the child due to spinal anaesthesia. The better the spinal anaesthesia the more the uterus was cut off from central control, and the more it was likely to go into spontaneous contraction. He had seen foetal distress become immediately apparent, and on two occasions it was impossible for the child to breathe in a lower segment operation because the uterus was in atonic contraction. It seemed to him that what was much more important than the virtues of one particular type of anaesthetic was the choice of anaesthetic.

The chairman, Mr. GILLIATT, in closing the discussion, said that anaesthetists were dissatisfied with the older and more usual methods employed in general surgical procedures. Some of them had carried out the operation with complete satisfaction to the patients when the anaesthesia was administered by any of the different methods advanced that evening. But he could not help feeling a distinct liking for an anaesthetic which did not involve inhalational methods. He felt that many of them would go away dissatisfied with the methods to which they had been accustomed, but stimulated by the accounts of methods so strongly recommended by others.

TUBAL PATENCY TESTS

At a meeting of the Devon and Exeter Medico-Chirurgical Society on March 20 Dr. MARGARET H. JACKSON discussed the value of tubal patency tests in the diagnosis and treatment of sterility. She referred to the pioneer work in this field of Ruben, Bonnet, Gordon King, Sharman, Meaker, Sicard, and Forestier. Tubal morbidity as a factor in infertility was estimated by some of those authorities to be more or less important in nearly 50% of all cases. In a series of 570 cases in which she herself had carried out tubal patency tests Dr. Jackson did not place the incidence of all kinds of tubal morbidity (including complete occlusion, partial or temporary occlusion by spasm or stenosis, and lack of normal tubal peristalsis) much above 30%, a figure lower than that of most workers. Moreover, of these, total organic occlusion after repeated patency tests was present in only about 10%. If the tubal patency tests were not carried out as a routine an essential causative factor in some cases of sterility would be missed. It should be remembered that the indications for testing tubal patency were not only diagnostic but also therapeutic, for a much desired pregnancy not infrequently followed. Acute pelvic infections contraindicated patency tests.

The best time to do them was during the middle third of the menstrual cycle, well away from menstruation, as near ovulation as possible and preferably just before it. With the patient in the lithotomy position a bivalve plastic speculum was inserted. Not more than 150–200 ml. of CO_2 should be used and pressure should never exceed 210 mm. Hg. Gentleness and asepsis were essential; antispasmodics should be given whenever there was evidence of spasm; but anaesthesia, with a very few exceptions, was unnecessary—indeed it was a disadvantage, because the patient's co-operation was required. Moreover, anaesthesia was of no value in the relief of tubal spasm. Pain was slight—rather like that of mild dysmenorrhoea—unless there was obstruction or unless pressure was raised unduly, whereupon mid-hypogastric pain, sometimes referred to the sacrum or iliac fossae, ensued. Late effects included referred shoulder pain on sitting up which was transient and seldom severe, or, after lipiodol, pelvic and sacral aching.

Repetition of Tests

The importance of carrying out repeated tests before accepting a diagnosis of complete occlusion could not be over-stressed. Tubal insufflation and lipiodol injection were complementary tests. Insufflation was inexpensive, not troublesome, and took only about 15 minutes. With a regularly tested kymographic apparatus peristaltic movements, spasms, and stenosis of tubes could be accurately recorded. A vulsellum hardly ever needed to be used. By insufflation alone one could not be sure if both tubes or only one was patent, nor could a block be located. Air embolism and sepsis were possible but avoidable dangers. By means of utero-salpingography the shape, size, and position of the uterus and of the cervix could be visualized; filling defects and spasticity shown; fixation of the uterus demonstrated by screening; the length and tortuosity of tubes and points of obstruction or occlusion noted. Moreover, lipiodol had a therapeutic effect. In discussing the aetiology of tubal morbidity Dr. Jackson emphasized the importance of tuberculosis of the uterus and tubes, which was often "silent" and of which no history could be obtained.

Correspondence

The Toxicity of Iron Compounds

SIR,—The paper by Dr. Gilbert Forbes (March 22, p. 367) has drawn attention to the toxic action resulting from accidental overdosage of ferrous sulphate taken by mouth. No mention is made of the name of the preparation, but we believe we are correct in saying that it was "fersolate" tablets, of our manufacture.

Experiments in progress in these laboratories indicate that for the more soluble iron compounds the toxicity is closely correlated with the iron content (calculated as ferrous iron) and strongly suggest that the action is due to the formation of ferric chloride in the stomach. The iron compounds were given, either in solution or suspension, to fasting rabbits by means of a stomach tube; the doses were adjusted to body weight. According to the dose, the animals either died in a few hours or recovered completely. The post-mortem findings for those that died were completely in agreement with those of Forbes, the cause of death being haemorrhagic gastritis. The animals that recovered were quite well on the following day; daily blood counts and urinary examination showed no abnormal findings. In some cases, but not all, the stomachs of these animals showed signs of irritation at the great curvature.

The results so far obtained indicate that the fatal dose of ferrous sulphate in rabbits is higher than those reported by Forbes for guinea-pigs. We find that "fersolate" tablets compare favourably for toxicity with other iron compounds so far tested, and the presence of small amounts of copper and manganese sulphates does not increase the toxicity, which is due to ferrous sulphate. The toxic effect of the iron in Blaud's pills is less than half that of other ferrous salts; but relatively higher doses are required for haemopoietic action.

The lower toxicity of Blaud s pills may be due to the sodium sulphate in this preparation having a cathartic action that hastens the excretion of the iron. Rabbits treated with high doses of Blaud's pills had a profuse diarrhoea within half an hour of dosing. It would appear, therefore, that a gastric lavage with an alkaline solution would be of value after accidental overdosage with ferrous sulphate. This would neutralize the acidity of the stomach, cause precipitation of ferrous carbonate, and prevent the formation of ferric chloride and retard the absorption of iron.

The results of further experiments, now in progress, will, it is hoped, be published in detail later.

Ferrous sulphate is one of many medicinal substances having undesirable effects when taken in grossly excessive quantities. We consider that Dr. Forbes's paper serves to emphasize the need to keep such preparations out of reach of young children, and to guard against overdosage.—I am, etc.,

Glaxo Laboratories, Ltd., Greenford, Middlesex. G. F. SOMERS.

SIR,—Dr. Gilbert Forbes (March 22, p. 367) has written a very important paper which has wide-reaching implications. Have we not been assuming too much that "harmless" drugs are innocuous even in large doses, and that the excess will be excreted without danger? The outstanding example is the vitamins which are found only in traces in natural products, and yet are prescribed medicinally in enormous quantities.

To return to the ferrous sulphate question, I remember some 12 years ago being stimulated by Dr. Helen Mackay's papers on anaemia in infants to order massive doses of ferrous sulphate as a routine procedure during the last months of pregnancy. After some months I abandoned this, as a number of women complained of headache, nausea, and malaise, and, if the iron were continued, developed a mild albuminuria. I was convinced that there was an association between these liver and kidney symptoms, resembling a pregnancy toxaemia, and the excessive iron intake, but I must acknowledge that I did not find anyone to agree with me. However, I have never given large quantities of iron in pregnancy since, and in the light of Dr. Forbes's cases with the reported damage to liver and kidneys I venture to bring up this theory once more and to ask whether anyone else has had a similar experience?—I am, etc.,

London, W.8. VIOLET RUSSELL.

Retrodisplacement and Fertility

SIR,—There is not the slightest doubt that retrodisplacement of the uterus is a cause of sterility. A woman with a backward displacement of the uterus *can* become pregnant, but if she is sterile and a backward displacement is present, the correction is followed by pregnancy in a very large number of cases. Needless to say, full investigation of both male and female is a necessity.—I am, etc.,

Dublin. BETHEL SOLOMONS.

The "Costoclavicular Syndrome"

SIR,—Prof. E. D. Telford and Mr. S. Mottershead raise in their paper (March 15, p. 325) several interesting points and advance new concepts of great importance to a proper understanding of the various factors involved in cases of brachial neuralgia. Probably owing to the paper shortage clarity has been sacrificed to compression in certain places.

The authors describe the operative findings in fourteen cases associated with cervical rib and extensive arterial thrombosis; except in two cases the thrombosis extended no higher than the lower border of the pectoralis major. Are these findings meant to imply that the cervical rib played no part in the syndrome and that no case of arterial damage due to cervical rib was found in this extensive series? Is it believed that the arterial damage was due to compression between the heads of the median nerve and that this was due, either directly or indirectly, to the fact that the cervical rib altered the relationship between the plexus and artery?

The stated "textbook picture of neurovascular bundle compression" fails to convey what is found in practice. In our experience there is no such picture. These cases differ considerably in history, symptomatology, and signs, and this difference has valuable diagnostic implications. The authors are undoubtedly right in casting doubt as to whether their remaining 69 cases of cervical rib were in fact correctly described. Prof. J. R. Learmonth's recent paper in *Thorax* undoubtedly gives a balanced judgment of this problem.

We believe that the case in which the axillary artery was compressed by the two heads of the median nerve is the first to be described and as such is of considerable importance. It might be helpful to consider this concept from its obverse angle. Consideration of the respective resistances of artery and nerve would lead to the expectation that symptoms would arise from the nerve rather than the artery in such a case. From the rather meagre clinical data provided it appears likely that this in fact happened. It might be preferable to contend that the median nerve was compressed by the artery. In fact, quite possibly this man's symptoms might have been alleviated by resection of his first thoracic rib, as this would have led to alteration of the artery–plexus relationship.

The challenging statement that in postural manœuvres of the shoulder resulting in obliteration of the radial pulse the axillary pulse can still be felt cannot be allowed to pass unquestioned. A small personal experience does not suggest its general validity and it is contrary to certain published evidence. It is not clear from the text or the table whether the authors in fact ascertained, in each case where the radial pulse was obliterated, that the axillary pulse was still present and undiminished. Further information on this point would be welcome and, in particular, if in fact all cases had not been examined, on which cases this statement was founded. Further, the statements in the summary, paragraphs 2 and 4, are contradictory; paragraph 4 is almost certainly a misprint, as the references quoted include several undoubted cases of costoclavicular compression proved at operation. The role of costoclavicular compression in causing a rise in venous pressure in the arm requires consideration (Sampson *et al.*, 1940). The evidence as a whole is suggestive that costoclavicular compression is common and cannot be disregarded. It is noteworthy that the rise of venous pressure on bracing back the shoulders cannot be attributed to median nerve compression. It is considerably lessened if the first rib is missing as in thoracoplasty. In these cases the average rise

in pressure was 2.3 cm. of water, while the rise in 26 normals was 6.7 cm. of water.

The section dealing with the anatomical dissections is interesting and informative but, in a way, unsatisfactory. A considerable amount of work has not been utilized to its full extent. Nerves are described as being "tightly stretched"—tension can be measured; "the clavicle moves from the rib"—distance and angles can be determined. Kelvin, throughout his life, stated a great though limited truth: "Science is measurement." There is no doubt that the rational assessment of anatomical problems is profoundly aided by the discerning analysis of even necessarily imperfect measurements. That this problem is not easy is appreciated, since we have been interested in its complexities and difficulties for some time. Telford and Mottershead have undoubtedly done a first-class piece of work, and this is properly acknowledged in your leading article, but their answers to some of the questions we pose would also be of great interest.—We are, etc.,

ERNEST FLETCHER.
ANTHONY FLETCHER.

London, W.1.

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Curare

SIR,—Dr. Massey Dawkins (Jan. 18, p. 111) has drawn attention to a condition of shock, as reported to him by nurses and ward sisters, among patients who have received curare, which, he says, is probably due to insufficient anaesthesia. The letters from Dr. A. J. Gray (Feb. 1, p. 196), Dr. H. G. Kahlenberg (Feb. 8, p. 234), and Dr. G. V. S. Wright (Feb. 15, p. 268) point to this condition of shock as being due to the profound muscular relaxation and anoxaemia from depression of respiration. Dr. D. S. Jones (Feb. 15, p. 269) suggests that post-anaesthetic complications may be due to an overdose of curare. From this one infers that the condition of shock results from overdosage of curare.

From these three theories surely far the most plausible is the second as proposed by Drs. Gray, Kahlenberg, and Wright. No patient should ever be allowed to return to the ward in such a condition, no matter what anaesthetic has been used. Precautions must be taken in the theatre during and at the close of the operation to counteract it, otherwise such excellent drugs as cyclopropane and curare become a veritable menace and fall into undeserved disrepute.

Certain points in the induction, maintenance, and recovery from anaesthesia where curare has been used seem pertinent. Where maintenance is to be by "pentothal" and endotracheal oxygen it seems important to administer *enough* curare to obviate laryngeal spasm and straining at the commencement of the operation; too little may lead to difficulties in intubation, with subsequent misuse of the drug's potent qualities and an upsetting of technique. Controlled respiration is then performed, and as soon as automatic respiration is resumed the partial rebreathing technique is resorted to, oxygen being the only gas inhaled. The soda-lime is then used in accordance with the desirability or not of quiet breathing. In this way the carbon dioxide in the circuit causes dissociation of oxygen from oxyhaemoglobin in the tissues. Tissue asphyxia and hypotonicity with diminished venous return are mainly due to depressed respiration leading to anoxaemia. This I submit is most often caused nowadays not from overdosage of drugs but from the use of prolonged carbon dioxide absorption and endotracheal tubes.

Except in the case of certain operations, among which I would include those demanding the full Trendelenburg, the use of an endotracheal tube certainly predisposes to diminished respiratory excursion from the necessity of having to use more curare. It seems therefore wiser not to use an endotracheal tube as a general rule, thus cutting down the amount of curare required, using only sufficient to procure adequate muscular relaxation, and to use only minimal doses of "pentothal." An endotracheal tube is not normally necessary provided an adequate airway is ensured, as in any case curare counteracts reflex laryngeal spasm even though a muscle-relaxing dose might not be sufficient to allow direct laryngeal intubation.

During maintenance the soda-lime should be cut out of circuit and the tissues given the benefit of carbon dioxide either self-generated in a cyclopropane anaesthesia or from a cylinder with the expiratory valve open in a "pentothal"–oxygen administration. With cyclopropane maintenance only sufficient curare is used to procure relaxation, and the soda-lime is periodically cut out whenever the respiratory excursion can be deepened. Air is admitted to the circuit before the close of the operation and further amounts of carbon dioxide used to help eliminate the anaesthetic. If respiration is still depressed there should be no hesitation in giving physostigmine and atropine intravenously before returning the patient to the ward.

Finally in cases where respiration is markedly depressed or where the blood pressure is not within 10 mm. Hg of the pre-operative level and where the pulse pressure is below 30, the usual clinical evidence of shock being present, intravenous plasma or adrenaline drip should be instituted without delay. Coramine and oxygen are prescribed and house-surgeons warned to withhold the use of morphine until the patient has fully recovered and it is certain that any restlessness is due to pain. For less serious degrees of shock, warmth and raising the foot of the bed and a rectal saline drip are measures to be instituted. As soon as possible the patient should be encouraged to sit up and moved from side to side and remedial chest exercises instituted, as pulmonary complications are prone to develop following upon such a condition of shock.

I have been interested to find that in one or two cases this condition of shock has been associated with a marked *diminution* in pulse rate to the region of 50 beats a minute. This is a common finding in cyclopropane overdosage and may possibly be an indication of "pentothal" overdosage as well, though I have not been conscious of administering an overdose in this respect. Again I can only surmise that the condition is due mainly to anoxaemia or oxygen lack in the tissues, occasioned by diminished respiratory exchange from too much carbon dioxide absorption, leading to a diminution in peripheral resistance. Coramine acts centrally so must be reinforced with an additional supply of oxygen. I would be interested to hear whether other anaesthetists have also experienced this state of affairs.

—I am, etc.,

W. M. MAIDLOW.

Bristol.

Clinical Freedom and the Board of Trade

SIR,—The Minister of Health recently declared that "it is a basic principle of the new Service that there should be no interference with the clinical freedom of any doctor—specialist or general practitioner." Why then has the Board of Trade this week issued an instruction as to the type of case for which a spinal support may be prescribed (*Supplement*, March 15, p. 33)? Thirty-nine diseases and deformities are listed, ranging from actinomycosis of the spine to ureterostomy. Apparently there will be no problem in securing a surgical appliance for spinal neurosis! Many of us may think that no treatment could be worse, but at least the Board of Trade has no objection. It is also gratifying to learn that a surgeon will have no difficulty when he makes a diagnosis of actinomycosis of the spine (of which I know of only six records in the literature of the world); a simple prescription will suffice. But for the scores of patients seen week by week and month by month with prolapse of an intervertebral disk, such a prescription will not be accepted. The surgeon must prepare "a fuller medical certificate," give "the precise condition," add "sufficient detail," send it to Horseferry Road, where the Board of Trade will examine it, and submit it to the medical advisers of the Ministry of Health, who in their wisdom will deliberate and in due course pass judgment, and then send it back to the Board of Trade for endorsement, who will return it to the surgeon and possibly grant permission for him to refer it to his instrument-maker. Does anyone believe that such a proposal is calculated to promote honesty in the minds of surgeons, or is it obvious that sooner or later the alternative of subterfuge will be adopted and, no matter what the true diagnosis may be, a suitable label will be found in one of the 39 listed conditions which is less of an untruth than others and the prescription made accordingly?

In short I do not complain that one of the most common of all spinal disorders has been left off the list; I complain that such a list has been made at all. I complain of legislation of such a type as to bring legislation into contempt. The object could have been achieved more successfully by reminding doctors that certain materials are still in short supply and that care is still needed in prescribing spinal supports and corsets. A simple letter of 20 words, conforming to the traditions of the profession, would have done much more than this blundering 500-word document with its central direction and civil service control.—I am, etc.,

REGINALD WATSON-JONES.

London, W.1.

Certificates for Corsets

SIR,—With laudable objective in mind brewers allocated a proportion of available supply of spirits for medicinal use, supplying and designating same as such and providing such in

addition to the quota available for ordinary use to the distributor. Only they forgot that an unscrupulous publican can inhibit all ordinary sales and provide distribution only by provision of a medical certificate for same, and as his supply of the latter is reimbursed for each medical certificate provided, the more medical certificates he receives the greater facility he is provided with to dispose of his weekly quota at gratifying prices to himself. That honest hostelers do exist, distributing their quota in fair portion to all their customers while still reserving a small percentage for immediate essential medical use, rather proves that the original reservation is not essential, nor in fact desirable.

This allegorical approach enables me to state with conviction that I have never seen half a valuable page of the *Journal* put to a greater degree of useless blether than is contained in the *Supplement* of March 15 (p. 33) describing what is apparently a face-saving measure for the original restrictions imposed on such an essential female garment as a corset, such measure in any case still stimulating the corsetière to obtain a quota-free corset for her client in preference to the private made-to-measure article, as the former is still apparently available free of purchase tax.

I note these arrangements have not been drawn up in consultation with the manufacturers, and venture to suggest that their advice might have been taken as to how they have successfully surmounted the prolonged epidemic of "severe visceroptosis" despite their shortage of skilled labour. The matter undoubtedly may now be left to their initiative in the confidence that essential demands will be met and the initiation of visceroptotic anxiety left to the hands of the charlatan.—I am, etc.,

Tipton, Staffs. L. H. EUNSON.

Diet and Canine Hysteria

SIR,—Sir Edward Mellanby's notion that canine hysteria was produced by feeding growing dogs on agenized flour (Dec. 14, 1946, p. 885) cannot be reconciled with experience of the behaviour of healthy dogs or the pathology of those diseased dogs which exhibit canine hysteria. It is very difficult to assess Sir Edward's data, since he omitted to correlate his clinical observations with the ante- and post-mortem pathology of his laboratory dogs and rats. Moreover, his statement that fits were observed "in the animals receiving treated [agenized] flour and were never seen in those having untreated flour" was qualified by his earlier statement that fits "could *often* be produced" by feeding agenized flour [my italics].

It would seem that some of the dogs which were fed on agenized flour did not show fits, but I cannot find any description of them: they are not illustrated in Sir Edward's three tables; they obtained even less notice than the rats, which were uniformly negative. This evidence should have been detailed since it is consistent with the anomalies of naturally occurring canine hysteria, of which I will cite two examples from my own records:

(1) No further fits have been observed in the dogs whose diet has been changed from biscuit to meat, whereas fits have persisted in some of the dogs whose diet (biscuit) has been maintained. Some observers have been misled by this phenomenon into attributing the cause of canine hysteria to certain dog biscuits. But I have studied canine hysteria in dogs which, since weaning, had been fed exclusively on meat. (2) No further fits have been observed in the dogs from which roundworms have been expelled, whereas fits have persisted in some of the untreated dogs, although no change has been made in the diet. Many have been influenced by this phenomenon into attributing canine hysteria solely to roundworms. For an understanding of the clinical phenomena the pathology must be fully studied.

My observations of naturally occurring canine hysteria have been incorporated in papers on the B.H.S. infection, which is a widely adopted abbreviation for the infection by various Lancefield groups of the *β-haemolytic streptococcus* (Hare and Fry, 1938; Hare, 1946). Canine hysteria is not a disease entity; it is an event which may occur in the course of a particular infection; it is a type of spasmophilia which is expressed by a proportion of dogs infected by the B.H.S. and roundworms (*Toxascaris* sp. and/or *Toxocara* sp.). The essential pathology of dogs which have been destroyed within 24 hours of showing canine hysteria is that of the B.H.S. infection plus the presence of a variable number of roundworms in the duodenum—i.e., chronic tonsillitis, hyperplasia of the reticulo-endothelial system, catarrh of the pylorus of the stomach and duodenum, albuminous degeneration of the liver and kidneys, and, as first recorded by the late Prof. John Eyre (1928), toxic encephalopathy.

In my cases I have not observed "loss of consciousness" and "epileptiform convulsions," which Sir Edward reported in some of his dogs. The label "epileptiform convulsions" (without loss of consciousness) was applied by nineteenth-century French and British veterinary authors to what is now termed canine hysteria. More recent work on the pathology has clarified the differential diagnosis of at least four distinct types of spasmophilia of dogs, one of these types being epileptiform convulsions, which are now recognized as due to the B.H.S. infection complicated by coccidiosis. Unfortunately some authors carelessly apply the words "epileptiform convulsions" (with loss of consciousness) to the behaviour of dogs which are in the condition of hepatic and renal failure. This is the pathology of the terminal stage of several diseases, one of which is the conjoint B.H.S. and roundworm infections.

From Sir Edward's statement that "a time may come, however, when a dog which seems to be acquiring immunity suddenly suffers the most severe epileptiform fits and dies" I infer that his dogs, to which he attributed "epileptiform convulsions" and "loss of consciousness," were in a condition of hepatic and renal failure. Sir Edward's description of his dogs' behaviour, apart from "epileptiform convulsions" and "loss of consciousness," seems to me to be consistent with the symptomatology of naturally occurring canine hysteria, which was described in French and British veterinary literature of over 60 years ago. Sir Edward has been gravely misled into attributing our knowledge of canine hysteria to American sources of the past 30 years.

I find further support for my inference that Sir Edward's dogs were suffering from the B.H.S. and roundworm infections from his description of "the actual observed state of the affected animals" in such phrases as: "the attacks seem to represent temporary exacerbations superimposed on a chronic abnormal condition"; "in young puppies the attacks came on insidiously and usually took some weeks to develop"; "lactating bitches appear to be particularly prone to hysterical fits." I accept Sir Edward's diagnosis of his dogs' behaviour as canine hysteria, not his startling notion of its aetiology. In my opinion he experimented on diseased dogs and mistook the expressions of their disease for the consequences of his dietary changes.—I am, etc.,

TOM HARE.

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Arsenical Encephalopathy

SIR,—The report of a case of arsenical encephalopathy and its treatment, by Drs. G. Hipps and R. Goldberg (March 8, p. 296), calls for some comment. Though a case of this nature may be rare in this country it can by no means be described as "a rare clinical condition." Such cases were commonly met with in India Command in the years 1942–5, and a large number of deaths occurred from post-arsenical encephalopathy during that period. The condition was almost exclusively confined to Indian O.R.s, the majority being natives of Southern India. Though the diet of Indian troops varied a good deal in its constituents from that of British O.R.s, the part played by subclinical vitamin deficiency or by deficient intake of amino-acids containing the essential –SH grouping could not be determined in these fatal cases.

Though symptomatic treatment of effects due to organo-arsenical intoxication is an important feature in the later stages of the syndrome, it is now known that specific treatment of the underlying chemo-pathology at an early stage will produce positive results. Recent work on the toxicity of arsenical compounds when injected into the body confirms the work of Voegtlin and his colleagues (Voegtlin, Dyer, and Leonard, 1923, 1925), who showed that organic compounds of the type R.As:As.R were inactive in that form but were oxidized in the body to the form R.As:O, and that only when they had undergone this change did they exert their toxic action either on the parasites or the host. They showed further that the

arsenoxide so formed reacted with sulphydryl groups in the body tissues and in the spirochaetes. Hogan and Eagle (1944) showed that the toxicity of any arsenoxide depends on its constitution and its ability to combine with essential functional groups in vital organs.

Many of the enzymes concerned with carbohydrate metabolism are known to be inhibited by reagents which react with sulphydryl groups (Cori, 1946), and detailed work on this subject has been carried out by Barron and Singer (1945) using a variety of reagents. Glutathione is one of the most important substances in the body containing the thiol group. It is probable that the vitamin-protein enzymes are similarly adversely affected by organo-arsenicals, for it is known that arsenic interferes with the conversion in the liver of vitamin B_1 to its co-enzyme form. The poisoning action of arsenoxide on glutathione is probably one which involves oxidation of its thiol group to a disulphide, resulting in the production of oxidized glutathione. This in turn will bring about the inactivation of succinic dehydrogenase, and as glutathione acts as a catalyst for glyoxalase, the action of this latter enzyme will be also in abeyance. Damage even more widespread will follow; the presence of the sulphydryl group in several oxidizing enzymes, as well as in several proteolytic and other enzymes, has been shown to be necessary for their activity (Bersin, 1935; Hellerman, 1937; Barron and Singer, 1945). In view of the fact that oxidizing agents in the cell tend to inhibit the activity of -SH enzymes, it is probable that one of the main functions of glutathione in cellular systems is concerned with the continuous reactivation of the -SH enzymes. Its capacity to bring about such a reactivation through its powerful reducing action has been demonstrated in many experiments.

Once enzymic balance has been upset recovery is very possibly hard to effect, and reactions will proceed in one direction faster than metabolism can control them. Lactic acid synthesis is retarded to such a degree that enzymic control in other directions is affected by the building up of aldehydic compounds. It is postulated that this is due to the inactivation of glyoxalase and succinic dehydrogenase, with a subsequent block in the tricarboxylic acid cycle.

The following chain of events leading to the development of arsenical encephalopathy has been suggested by Lydon: (1) Interference with cellular metabolism. (2) Accumulation of metabolites in C.N.S. cells (which are most sensitive to changes in oxygen tension). (3) Increased retention of fluid by cells, with oedema of tissues. (4) Interference with normal capillary circulation. (5) Congestion and subsequent focal necrosis. The characteristic pathological changes found in fatal cases support this theory.

The immediate treatment of post-arsenical encephalopathy should be one which aims at preventing the establishment of the vicious circle mentioned above and opening the way for the restoration of the metabolic sequence known as the Krebs tricarboxylic acid cycle. While it has been shown that the toxic action of arsenoxide is inhibited by the intravenous administration of reduced glutathione (Voegtlin *et al.*, 1925), recent studies have proved that the most effective compound in use as an antidote against heavy metal poisoning is 2,3-dimercaptopropanol (BAL), which in dogs is many times more effective than glutathione (Long and Farah, 1946). It is recognized that these compounds exert their maximal therapeutic action when given at the earliest possible opportunity after a diagnosis of organo-metallic intoxication has been made. As excess of succinate protects its dehydrogenase from the inhibitory effect of oxidized glutathione, the combination of a succinate and an organic thiol compound given parenterally should, in theory, give the maximal therapeutic result if administered immediately arsenical intoxication is suspected.

The practice of using intravenous glucose does not appear to be physiologically sound in view of the fact that a disturbance of carbohydrate metabolism is occurring. Double-strength plasma would seem to be the agent of choice in counteracting cerebral oedema. The use of a compound such as calcium thiosulphate does not present an available thiol radicle but merely introduces sulphur in inorganic form. One of the organic thiol or di-thiol compounds mentioned above will produce a far greater and more rapid therapeutic effect. These compounds are now quite easily obtainable.—I am, etc.,

Lancaster. E. A. J. BYRNE.

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Treatment of Post-operative Pulmonary Atelectasis

SIR,—The annotation on a new treatment for post-operative atelectasis (March 22, p. 386) prompts me to inform you of a method of dealing with this condition which I have used occasionally during the past two years. The method is to stimulate coughing by the introduction of 1 ml. of water, by means of a syringe, into the respiratory passages, the needle being passed into the trachea at about the level of the first ring—that is, below the cricoid cartilage. This method is not intended to supplant bronchoscopic aspiration, which, all observers agree, is the ideal method of treatment, and which should be undertaken as soon as signs of atelectasis appear, but the introduction of water may serve as a simple substitute if the facilities for bronchoscopic aspiration are not available.

The last case which I dealt with by this means was a man of 44 who had had a Polya gastrectomy for duodenal ulcer on March 4, 1947. When I visited him on the evening of March 5, he had an atelectasis of the left lower lobe. The surgeon who had operated on the case had left instructions that he was not to be disturbed, and, as he was not to be found, I decided to employ the water technique, though I should have preferred to use the bronchoscope. The effect was excellent: after a violent spasm of coughing, in which considerable sputum was brought up, he stated that he felt better, and his dyspnoea disappeared at once. He continued to bring up sputum for a few days, but all signs of atelectasis had gone, and the temperature, which had been raised on the evening of March 5, became and remained normal.

The birth of this method occurred when I was anaesthetist to a surgical team for chest surgery in the B.L.A., the surgeon in charge being Major J. Leigh Collis, of Birmingham. A patient was brought in with collapse of the right lower lobe, the cause being a piece of tinned bacon which he had inhaled. I anaesthetized the patient for bronchoscopy by swabbing the pyriform fossae with 15% cocaine, and then introduced 1 ml. of the same fluid into the trachea through the top ring. The patient immediately coughed and expelled the greater part of the inhaled bacon. This suggested to Major Collis and myself the method of causing expulsive coughing which I have described above.

I am tempted to make two comments on Grandstaff's work, to which your annotation was directed. First, although I have not seen the original article, I find great difficulty in believing that, of a total of 2.6% of respiratory complications following operation (an extremely low figure), two-thirds had pneumonia. My own experience, in common with everyone else whom I have consulted, shows that atelectasis is by far the commonest of major respiratory post-operative complications, and that the pneumonia rate is only a very small fraction of this. Secondly, while not denying the possibility, remote though it appears to be, that analgesia of the larynx may cause dilatation of the bronchi, it would hardly appear that this of itself would cure atelectasis: it is also necessary that the offending plug be removed, either by aspiration or by coughing. With all due deference to the author of your annotation, swabbing of the pyriform fossae does not "inevitably produce severe coughing"; in fact, it practically never does. For this reason Grandstaff's method might well be improved by stimulation of coughing by some such means as I suggest.

While on the subject, I should like to mention a point of diagnosis which I have never seen in print: the dyspnoea in atelectasis is always more severe than the physical signs would appear to warrant, and the sudden onset of severe dyspnoea after operation is strong presumptive evidence of atelectasis.

It is a very encouraging sign that attention is now being directed to the diagnosis and treatment of post-operative atelectasis. Lives have been saved, and many days of convalescence averted, by the prompt use of the bronchoscope. It is most necessary that all anaesthetists should become expert in the use of this instrument, and also expert diagnosticians of thoracic disease. Too often, even now, surgeons are content to classify all cases of atelectasis, bronchitis, pneumonia, or what-have-you as "anaesthetic chests" and to bother no more about them.

In conclusion, while stressing the need for early bronchoscopic aspiration, let it not be forgotten that postural coughing

stimulant cough medicines, breathing exercises, and carbon dioxide also have their place in the treatment of post-operative atelectasis.—I am, etc.,

Newcastle-upon-Tyne. M. H. ARMSTRONG DAVISON.

Penicillin for Breast Abscess

SIR,—A recent article by Florey, MacVine, and Bigby (Dec. 7, 1946, p. 845) stimulates me to present the results of a series of cases treated by one method which they employed—namely, aspiration of the abscess and injection of penicillin solution into the cavity. The technique employed was essentially similar to that which they advocate. The cases referred to presented themselves mainly in the spring of 1946, when the shortage of beds was extremely acute. Previous work on the value of penicillin used locally in abscess cavities of various types, both acute and chronic, infected with the staphylococcus, and particularly the occasional reports of breast abscess treated by such methods, suggested that these cases might respond to local penicillin. They were therefore treated as out-patients in the casualty department of the Royal Infirmary, Leicester.

The series consisted of 24 cases of whom 15 were primipara and 9 were multipara. Of the latter, two presented with abscesses in both breasts, and four gave a history of mastitis in a previous pregnancy, including both the bilateral cases. About one-third of the mothers had not persisted with breast-feeding for more than a few days, and subsequently had not regularly emptied the breasts.

The abscesses were first seen in various stages of suppuration from early localization to obvious fluctuation. All cases were treated as follows. Aspiration of the abscess was carried out using a wide-bore needle and with full sterile precautions. Pus was found in every case. The pus was replaced with calcium penicillin in normal saline in amounts varying from 50,000 to 200,000 units through the series. A light general anaesthetic was employed with very nervous patients. Cultures of the pus were made in each case and all yielded penicillin-sensitive *Staph. aureus*. The procedure was repeated in 24 hours in all cases. In 19 cases, including one bilateral, relief from pain was considerable within the first 24 hours of treatment. In the remaining five cases the abscesses remained large, and further daily aspirations up to the fifth day were made. These were all late cases when first seen, with well-established cavities. Two eventually healed after discharging freely from the sinuses which had formed along the needle tracks. The remaining three required incision and drainage.

Of the 19 cases which cleared up satisfactorily, 2 relapsed, one after 10 days and the other after 16. Both were given two further aspirations and injections of 100,000 units of penicillin, after which they healed with no further trouble. *Staph. aureus* was again grown from both.

All the cases in the series were given a routine course of 30 mg. of stilboestrol spread over five days and the normal breast was manually expressed until the flow ceased. In the 19 cases which responded well the total duration of treatment until complete recovery was approximately two weeks, although in some cases a firm painless nodule could be felt up to the fourth and fifth week. The quantity of penicillin injected appeared not to affect the recovery time to any marked extent. In about half the cases, particularly those from which fairly large quantities (more than 5 ml.) of pus were aspirated, sinuses formed along the needle track and pus discharged freely. All dressings were therefore performed with a completely sterile technique.

(1) The series is too small for generalization, but it seems clear that in cases seen early in the stage of localization, when the volume of the abscess is small, this method of treatment is a satisfactory one and an improvement on surgical methods; however, in late cases where large cavities are present it would appear not to be efficacious except as an adjunct to incision and drainage. In this case the intramuscular route is probably the best method of administering the penicillin.

(2) These cases can often be treated in a satisfactory manner as out-patients without surgery, particularly in view of the present bed shortage.

(3) Inquiries among several practitioners in the district suggest that the aetiology of many cases in an industrial town such as this is closely connected with the fact that many women resume work shortly after the puerperium and find it inconvenient or impossible to continue breast-feeding. They do not, however, empty the breasts adequately and stagnation of milk occurs.

I am indebted to Mr. Rizelle, the surgeon in charge of the casualty department, for permission to publish this article and for his advice at all times.—I am, etc.,

West Drayton, Middlesex. S. J. KRISTER.

Co-opted Members on Negotiating Committee

SIR,—It may not be obvious to everyone that the sub-committees of the Negotiating Committee contain the names of many co-opted members, but it is a fact which, I think, needs definite stressing. It is no doubt necessary to adopt this procedure in order that each particular division of practice should receive the fullest consideration in relation to the Act.

In view of the amount of careful thought, time, and trouble which have been bestowed on the negotiation and election of the Negotiating Committee, it is to be hoped that the votes of such co-opted members will in no case outweigh those of the elected members, especially when one remembers that the report of the Negotiating Committee on a previous occasion was in fact the report of a small subcommittee which was put, quite formally and without the opportunity for discussion, to the full Negotiating Committee before being considered by the Council.—I am, etc.,

Hungerford, Berks. D. H. STUART BOYD.

National Health Service Act

SIR,—Dr. D. G. ff. Edward (March 15, p. 352) contends that we ought not as a profession to oppose the new medical service Act because to do so is undemocratic. May I try to expose the fallacy of such argument? Many besides him are bemused by it nowadays. In fact the general cry is for democracy as the universal cure-all.

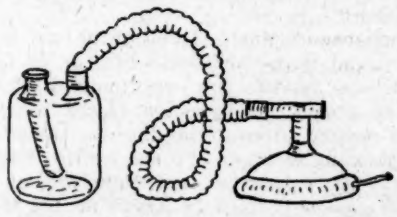
A little reflection will show that a whole-hog version of it can never achieve real efficiency in government for the simple reason that its actions can only be the resultants of the more or less fused ideas of every individual on the electoral roll. Some may be very well informed and well balanced while others will be comparatively ignorant or stupid or both. Efficiency under the democratic system is only to be achieved when people will curb themselves and refrain from interfering in matters they do not understand. On the other hand, those who do understand should assert themselves and explain to, persuade, and be prepared to lead their fellows. That is what our position should be. The general mass of the people is as profoundly ignorant of the working of our profession as it is of the science and art of medicine. If we keep silence we let the whole affair go by default, for we have abundant evidence that the Government itself is little if any better informed in this business than the "man in the street."

Anyone desiring to study this matter further will do well to read *The Limits of Pure Democracy*, by W. H. Mallock; Chapman and Hall; 1918—a veritable mine of information and sound thought.—I am, etc.,

Doncaster. W. REGINALD WILSON.

Trichlorethylene in Midwifery

SIR,—Perhaps some of those who have inquired about the use of trichlorethylene in midwifery might care to try the simple, cheap apparatus which I described in 1944 in the *Journal of Obstetrics and Gynaecology*.



The first apparatus was improvised in a few minutes and could be again by anyone wishing to try the method. The concertina rubber tube is disconnected from a standard Boyle's gas–oxygen machine, complete with face-piece and three-way gas-cock. The free end of the tube fits nicely over one neck of a 16-oz. (450-ml.) Woulfe's bottle. A piece of standard rubber drainage tube is inserted into the other neck of the bottle so as to fit closely and reach to within about two inches of the bottom. It is then cut off flush with the neck, the natural curve of the tubing being allowed to direct it to the centre. The mask must be of the inflatable rim type and in good condition. In the absence of positive pressure from gas cylinders, etc., the

amount of the drug inspired depends entirely upon the gas-tight fit of the mask. One ounce (28.4 ml.) of trichlorethylene poured into the bottle makes the apparatus ready for use. The three-way tap is kept permanently in the "valves" position so that the patient inspires over the trilene and expires into the air. To make the apparatus more foolproof, so that the analgesia can be self-administered, a special gas-cock, made for me by A. Charles King, Ltd., can be used. With this the tap position cannot be varied and the valves are of a special low-inertia type.

The cost of the apparatus, using new parts throughout, was about 50s. in 1944, which is ludicrously low compared with that of any other machine. In addition to the above a small wooden box, in which to stand the Woulfe's bottle to prevent its being knocked over, can be used if desired. The diagram will perhaps eke out the deficiencies of the description.—I am, etc.,

Stockport, Cheshire WALTER CALVERT.

REFERENCE

Calvert, Walter (1944). *J. Obstet. Gynaec. Brit. Emp.*, **51**, 140.

Shortage of Nurses

SIR,—There has been a great deal of prominence given recently to the shortage of nurses, which, as Dr. Leonard Ley says (March 15, p. 355), is already serious. I have not so far seen any helpful constructive suggestions from the General Nursing Council itself. In this profession good pay, food, and accommodation are not *all* that is necessary to attract younger men and women. Happiness, peace of mind, and interest in one's work are far more valuable to the individual than "good hours of work."

I think a great many suitable, capable, practical nurses are lost to the profession on account of the excessive amount of book work and lectures—often far too advanced and detailed for the needs of a good practical nurse. How often do the lectures and tutorials interfere with the continuity of their ward duties and so damp their interest? These young keen recruits are given lectures on all sorts of quite new subjects and have to copy out their lectures afterwards in their "spare" time. These lectures may then be "corrected" by the sister tutors—surely a very boring process for both parties. Far better give them questions to answer on paper if they must have "home work" and let the sister tutor correct these. The introduction to the theory of nursing is far too rapid and too short, and I think the suggestions in the last two paragraphs of Dr. Ley's letter are suggestions on the right lines.

There seems to be a lack of appreciation on the part of the General Nursing Council of the fact that recruits in former days were mostly from the 20–30-year-old group, whereas now they range from 17 years upwards. What is the use of trying to teach these young people about the circle of Willis, the functions of the pituitary and suprarenal glands and the endocrine secretions, the sympathetic nervous system, or about cisterns, traps, drains, water standards of purity for domestic use, and "parasites" (just as a whole—no detail in the syllabus), all of which are included in the General Nursing Council syllabus?

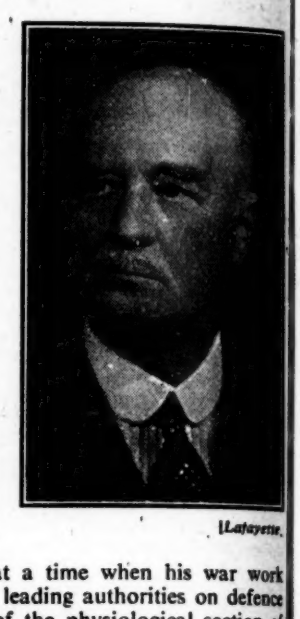
A great opportunity was lost during the war by not giving those women who were "directed" into or chose nursing in preference to the Services the opportunity of learning more about nursing proper. A question to all those who were directed into nursing duties during the war should prove helpful and enlightening to those who are worried and puzzled by the position. As I have written elsewhere on a previous occasion the questions must be searching for the truth and should include such questions as: Why did you prefer nursing to the Services? How much actual nursing did you do and over how many years? Were you asked if you would like to become a trained nurse or were you offered any suggestion that you should sit the preliminary examination? Would you still take up nursing if you were allowed a year or more off the training period on account of your war service? What suggestions would you make to attract more recruits to the nursing profession? Surely such a questionary, if properly analysed, would provide ideas for the better recruitment of nurses.—I am, etc.,

Aberdeen. W. M. GRAY.

Obituary

SIR JOSEPH BARCROFT, C.B.E., F.R.S.

Sir Joseph Barcroft died suddenly at Cambridge on March 21 at the age of 74. He was one of the great figures in British physiology. His classical researches were on the respiratory function of the blood, and in the course of his investigations he devised, among other instruments, the Barcroft apparatus, a differential manometer for measuring gases in small samples of blood. His work in this field is familiar to every medical student. Sir Joseph Barcroft was professor of physiology at Cambridge from 1926 to 1937. After his retirement he began a new career of research in animal biology, to which he contributed almost as much as to human physiology.



[Lafayette.

Joseph Barcroft was born on July 26, 1872, a son of the late Henry Barcroft, of Newry, Co. Down. He was educated at Bootham's School, York, and at the Leys School, Cambridge, before entering King's College, Cambridge, where he was a prizeman and exhibitioner in 1894. He took a first in both parts of the Natural Science Tripos and graduated in 1896. He was awarded the Gedge Prize in 1900, the year in which he was elected F.R.S., and only shortly after his election to a fellowship at his college. While reader in physiology in the university he soon became known as an able lecturer and research worker. He was Oliver Sharpey lecturer at the Royal College of Physicians in 1915 at a time when his war work was fast making him one of the leading authorities on defence against gas. He was president of the physiological section of the British Association in 1920 and Fullerian Professor at the Royal Institution from 1923 to 1926. Whereas his work before the war had been mainly concerned with the action of haemoglobin as a carrier of oxygen, his interest now shifted to various problems of blood flow and respiration. Later still he worked on the physiology of the nervous system as controlling respiratory movement.

In 1925 Barcroft, on the death of Langley, succeeded to the chair of physiology in Cambridge. Throughout an active life he played a prominent part in maintaining the high tradition of the Cambridge School of Physiology. As head of a large laboratory he found time to take a lively interest in many different investigations, without actively interfering with the natural development of the ideas of his colleagues. His own contributions were many, but perhaps his greatest influence on physiology was through his encouragement of the work of younger men. His enthusiasm, his good humour, his attractive style of writing and speaking, and his unusual gift for putting the complicated results of profound thought into the simplest possible language inspired many with a love of his special subject. Though he was not a medical man, much of Barcroft's work was with human subjects, and much of it had a dramatic quality that excited interest in other than academic circles. Thus for many years he represented Cambridge against Oxford in favour of the view that the passage of gases through the epithelium of the alveoli of the lungs was a simple physical process, and that even under adverse conditions the lungs could not take up oxygen unless the oxygen pressure in the air was greater than that in the blood. In the course of his work on this subject he led an expedition up the Andes at one time, and on another occasion he exposed himself to low oxygen pressures for several days in a glass box in his Cambridge laboratory.

He was knighted in 1935 and in 1937 he was succeeded by Prof. E. D. Adrian. At this point in his life he had already received marks of distinction from many foreign societies

He had been a member of the chemical warfare committee at the War Office and had been made a C.B.E. in 1918. He had honorary degrees from half a dozen universities, and he might well have rested on his undoubted laurels. Instead, he applied to animal biology all the vigour, skill, and enthusiasm which had formerly been directed to the problems of human physiology. Fundamental research on the large domesticated animals had been somewhat neglected in this country, and it was in 1944, at the age of 69, that he became Director of a new Unit of Animal Physiology for the Agricultural Research Council. He introduced new techniques for watching developing embryos, and he took up an old problem in a new guise—that of the oxygen supply to the foetus *in utero*. Soon a stream of interesting results and papers began to come from his unit. The first volume of his *Researches on Pre-natal Life* has only recently been published and is perhaps the first book of its kind. It deals with the development of function in the progress of foetal life and describes for the most part investigations made in the schools of physiology and agriculture in Cambridge, either by Barcroft or by his colleagues and pupils. Most of this work was done upon foetal sheep. There is a comparison between placental and foetal growth in the sheep. There are experiments showing the variation in fats and sugars as between the maternal and foetal blood. There are chapters on growth, and on the relation between maternal nutrition and foetal development. Numerous experiments are described on the transfer of blood from the placenta to the foetus at birth. Like his earlier books, this last contribution bears witness to the breadth of his interests and to his experimental ingenuity. In the midst of all this work he found time to test Anderson shelters on the range at Woolwich and to experiment with dehydrated meat.

Barcroft's teaching, like his research, made no parade of learning. In the physiological laboratory at Cambridge he was always ready to help an undergraduate with the most elementary experiment and with a simple friendliness that immediately put the student at his ease. In 1943 he received the Copley Medal, the highest award which the Royal Society can give. During his 74 years of active life there were few honours which had not come his way. But physiologists all over the world will remember him as "J.B.," a worthy successor to Michael Foster and Langley.

Prof. Thomas Nicol writes: Dr. R. J. GLADSTONE was a much-loved and respected member of the Anatomical Society and will be greatly missed by his many admirers and friends. Especially do we feel his passing a personal loss at King's College, London, where he had worked since 1912. Even during his retirement he remained attached to the anatomy department and produced a beautiful series of illustrated sections of embryos, which is of great value for teaching and research. This work was completed only just before his death. His wide knowledge of biology and comparative anatomy, his great artistic gifts, and his constant thirst for further information resulted in many contributions to anatomical knowledge; and these are especially valuable because of his critical judgment. He was always a champion of the young man, and there are many who will for ever owe him a great debt. His willingness to help others was one of his outstanding qualities. We extend to his widow and family our deepest sympathy in their irreparable loss.

Dr. RICHARD RICE died at his home in Harwell, Berkshire, on March 7, aged 88. He qualified at Charing Cross Hospital in 1879, and was in general practice until January, 1945. He married in 1885 Helen, daughter of the late Col. W. A. Ross of the Bengal Artillery, and is survived by four of his seven children. He had been a member of the British Medical Association for over sixty years.

A. A. B. writes: Richard Rice possessed a radiantly healthy mind and body. For sixty-two years he practised at Harwell, giving unstinted service to the people in the surrounding countryside. His powerful personality, combined with a deep understanding of men and women, his industry and sustained professional skill, had made him loved and respected by thousands. For many years there was no other doctor within a radius of seven miles, and so an eminently sound clinician soon became an outstanding practitioner and obstetrician. During his whole career he seldom took a holiday. He was an energetic and faithful churchman and a churchwarden of the parish church for over half a century. He sang in the choir until he retired from practice, and for many years was choirmaster. There were few positions of trust locally which he had not held at some time. For years he hunted twice a week during the season. An endearing side of his character was his championship of the young in any discussion, and his enduring love for small children. To accompany him on a long country round into the downland villages was an unforgettable experience. The bare bones of general practice became miraculously clothed as he recounted incidents of vivid interest from the past.

Dr. Margaret L. Weir writes: It was with a feeling of great personal loss that I heard of the death of Dr. Richard Rice. I had the privilege of being his first assistant and partner. Dr. Rice was a clinician of the highest order, and a man of unalterable integrity. He combined professional skill with a clear, sympathetic understanding of his patients, and gave himself unsparingly to the service of all classes of the community, who in return gave him their deepest trust and love. As a family doctor he had an extensive maternity practice, and in this particular branch he will be long remembered for his high professional ability, kindliness, and infinite patience. During his few hours of leisure he read extensively, taking a keen interest in every new development of medical science. He was a great lover of Nature, and got much happiness and peace in his garden among his roses.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

The following degrees were conferred on March 15:

M.D.—*F. S. Maclean, J. W. Crofton.
M.CHIR.—A. S. Till.
M.B., B.CHIR.—*W. B. Webb.

* By proxy.

UNIVERSITY OF LONDON

Edward Tenney Casswell Spooner, M.D., has been appointed to the University Chair of Bacteriology and Immunology tenable at the London School of Hygiene and Tropical Medicine from Oct. 1.

Robert Henry Stewart Thompson, D.M., has been appointed to the University Chair of Chemical Pathology tenable at Guy's Hospital Medical School from Oct. 1.

Hans Grüneberg, M.D., has been appointed to the University Readership in Genetics tenable at University College from Oct. 1, 1946.

UNIVERSITY OF LONDON

Alan Kekwick, M.B., B.Chir., M.R.C.P., has been appointed to the Chair of Medicine tenable at the Middlesex Hospital and Medical School from Oct. 1, 1946.

UNIVERSITY OF LIVERPOOL

The following candidates have been approved at the examinations indicated:

M.D.—Anne E. McCandless, H. Peaston, T. G. Richards, A. G. Rickards.
M.B., CH.B.—[1]J. C. Davis, [1]Janet H. Mountford, [1][2]H. H. Whincup.
FINAL M.B., CH.B.—*Part III*: Olive M. Bell, J. H. Brenner, G. B. Brown, Mary E. Casper, Beryl G. Castell, J. B. Cowie, W. M. Edwards, Jeanne A. Elphick, D. W. A. Evans, A. J. Farmer, I. L. Francis, H. J. Gilbride, T. H. H. Green, P. Hampson, M. F. Holt, Joan M. Hughes, E. Jones, Meira Jones, S. Kalinsky, H. Keidan, F. D. Kitchin, Edith G. Mercer, Alicia J. Middle, J. Moloney, Dorothy M. Morris-Jones, J. M. Old, W. L. Owen, Dorothy C. Peterson, Helen Poole, J. S. Porterfield, J. K. M. Rawlinson, Elizabeth Rhind, L. Robinson, D. L. Sharples, K. S. Shaw, W. B. Smellie, R. J. Smith, Elizabeth Taylor, W. A. L. Thompson, B. Towers, Pamela J. Tyson, D. G. Walker, Barbara M. Webber, D. J. West, D. P. C. Williams, Jessie I. Young. *Medicine and Obstetrics and Gynaecology*: F. G. Anderson, I. S. J. Crosbie, Elizabeth Howarth, J. E. Ridding, Audrey A. Shone, M. H. Turner. *Medicine and Surgery*: E. Dewsbury, Nancy V. Dilling, Sheila K. Frazer, A. B. Jones, F. P. Lennon, G. C. Slee, L. C. Wolfman. *Surgery and Obstetrics and Gynaecology*: W. Ellenbogen, G. I. T. Griffiths, G. L. Levy, G. H. Lucas.
D.P.H.—*Part I*: A. R. Unsworth, P. Weyman.
CERTIFICATE IN PUBLIC HEALTH.—G. Davies, Barbara W. Gerrard.

[1] With second-class honours. [2] Distinction in surgery. [3] Distinction in obstetrics and gynaecology.

UNIVERSITY OF MANCHESTER

At a special meeting of the University Court held on March 21, authority was given for the conferment, on May 21, of the honorary degree of D.Sc. on Prof. Edgar Douglas Adrian, O.M., M.D., F.R.S., F.R.C.P., for contributions to the study of physiology. The following candidates have been approved at the examination indicated:

D.P.M.—*Part I*: G. Christie, A. Clark, H. A. Cole, R. Cotter, R. C. Cunningham, S. Falk, F. Howarth, I. McD. Kerr, M. G. McColl, R. S. Williams.

UNIVERSITY OF SHEFFIELD

The following appointments were made at a meeting of the University Council held on March 21: *Honorary Lecturer in Venereal Diseases*, Douglas Ogilvie Stevenson, M.B., Ch.B. *Tutor in Child Health*, Cynthia Mary Redhead, M.B., B.S. *Assistant Tutor in Obstetrics*, Samuel James Barr, M.B., Ch.B.

UNIVERSITY OF BIRMINGHAM

Lancelot Hogben, D.Sc., F.R.S., Mason professor of zoology, has been appointed to the Chair of Medical Statistics in the University.

UNIVERSITY OF EDINBURGH

The seventh Sharpey Schafer Memorial Lecture will be delivered by Dr. Charles H. Kellaway, M.D., F.R.S., F.R.C.P., F.R.A.C.P., director-in-chief, Wellcome Research Institution, London, on Tuesday, April 22, at 5 p.m., in the University New Buildings, Teviot Place, Edinburgh. His subject is "The Perfusion Experiment in the Study of Tissue Injury." All interested are invited to attend the lecture.

UNIVERSITY OF GLASGOW

A series of papers will be read in the Department of Ophthalmology of the University on Wednesdays, at 8 p.m., from April 9 to 30, both dates inclusive. The general arrangements will be similar to those in the series held last year, and the meetings will be open to all medical practitioners and senior students interested in ophthalmology. Details will be published in the diary column of the *Supplement* week by week.

CONJOINT BOARD IN SCOTLAND

The following candidates, having passed the final examination, have been admitted L.R.C.P.Ed., L.R.C.S.Ed., L.R.F.P.&S.Glas.:

J. D. Bowie, Audry G. Burdett, J. G. W. Cunningham, M. Devlin, Pearl I. Evans, W. Frame, J. M. Gillies, S. J. Glueck, A. J. Graham, F. H. Hamill, Winifred M. Hiscock, R. J. Kleinglass, G. Metz, W. C. Palmer, E. L. Peel, N. W. Preston, I. M. Ratner, J. M. Raynor, Eva Revesz, S. Rose, Georgina M. H. Smeaton, B. Taylor, W. B. Willder, R. Wolfson.

Medico-Legal

COCAINE IN MISTAKE FOR PROCAINE

The danger of prescribing by telephone was again grimly illustrated at a recent action in the High Court before Mr. Justice Hilbery. A patient undergoing a jaw operation at Wellhouse Hospital, Barnet, died after an injection of 80 ml. of 1% cocaine solution with 1/20,000 adrenaline. His widow sued the Hertfordshire County Council and Mr. Alan Henderson Hunt, the surgeon, for damages.

Mr. Hunt said in evidence that on the day before the operation he telephoned instructions to Dr. Eleanor Knight, who was not then qualified but was acting as student house-surgeon, to have ready 100 ml. of 1% procaine and 1/200,000 adrenaline, adding that the dose of the latter was about 5 minims (0.3 ml.). He always, he said, used the name procaine; "novocain" was a German trade name and since the war its use had been discouraged. No prescription was needed for the solution he had ordered, and Miss Knight ought to have known that the cocaine solution was lethal. He also maintained that the pharmacist should, before dispensing the solution, have obtained written instructions and the signature of a qualified person, or have queried the verbal instructions.

The learned judge, after a hearing lasting four and a half days, found that Mr. Hunt, Dr. Knight, and the pharmacist had been negligent. Although, he said, Mr. Hunt expected Dr. Knight to use her skill and reason and to bring her mind to bear on what he was saying, he was still under a duty to ensure that he was getting what he ordered. Dr. Knight was negligent because she knew the solution was lethal and required for an injection. The pharmacist was at fault for accepting an order by word of mouth for an unheard-of dosage for injection of cocaine and adrenaline, and for taking no steps whatever to insist upon a qualified person initialling the order. He had made no attempt to check with Mr. Hunt, and had disregarded every sort of ordinary safeguard in the making-up of dangerous drugs, together with the instruction in the *British Pharmacopoeia* that a pharmacist, when required to dispense an unusually large quantity of a dangerous drug, should take steps to verify. The hospital was responsible for the negligence of Dr. Knight (not then qualified) and of the pharmacist, but not for that of Mr. Hunt. In addition, it had permitted the use of a dangerous and negligent system under which a pharmacist was able on a verbal order to dispense a phenomenal amount of a dangerous drug without a qualified person's signature; and had failed to bring to Dr. Knight's attention the rules concerning dangerous drugs. He awarded £2,500 damages and costs, to be shared equally between Mr. Hunt and the hospital.

Medical News

Clinico-pathological demonstrations will be given in the Meyerstein Lecture Theatre of Westminster Hospital School of Medicine (Horseferry Road, S.W.) on Monday, April 14, at 5 p.m., when two cases of hypertension, (1) peri-arteritis nodosa and (2) tumour of adrenal, will be shown.

A meeting of the Eugenics Society will be held at the Royal Society's rooms (Burlington House, Piccadilly, W.) on Tuesday, April 15, at 5.30 p.m., when Dr. Linford Rees will speak on "The Physical Constitution in Mental Illness." All interested in the subject are invited to attend the meeting.

Lord Rothschild will deliver the annual oration on "The Problem of Fertilization" before the London Jewish Hospital Medical Society at the West London Synagogue, Seymour Place, W., on Thursday, April 17, at 8 p.m.

A general meeting of the Heberden Society will be held at 11, Chandos Street, London, W., on Friday, April 18, at 5 p.m., when Dr. Graham Weddell will deliver an address on "The Structure of Striate Muscle in Relation to its Function." A discussion will follow.

A two-day conference, intended mainly for teachers and welfare workers but open to the general public, on "Education for Family Life" will be held in Manchester on April 21–22 by the Extra-Mural Department of the University of Manchester assisted by the British Social Hygiene Council. Lectures will be given by Dr. Ethel Dukes, Mr. Cyril Bibby, Mr. R. Weatherall, and others. The fee for the course will be 5s. Particulars are obtainable from the Director of Extra-Mural Studies, the University, Manchester, 13, or from the Secretary, British Social Hygiene Council, Tavistock House North, Tavistock Square, London, W.C.1.

The Royal Free Hospital Old Students' Association reunion dinner will be held at the Café Royal, Regent Street, London, W., on Wednesday, April 30. Tickets 25s. (wines exclusive) may be had on application to either of the honorary secretaries of the association, Dr. Barbara Mitchell (6, Church Street, Epsom) or Miss Jocelyn Moore, F.R.C.S. (4, Devonshire Place, W.1).

The New York Academy of Medicine has attained its 100th anniversary and is celebrating the occasion with a series of lectures and discussions in March and April. It has also issued a small illustrated pamphlet outlining the history of the Academy. The Academy was founded on Jan. 6, 1847, "to foster the best ethical relation between the profession and the public and within the profession itself . . . for the continued education of the physician and for the encouragement and promotion of the advancement of the medical science in all its numerous parts and phases." The Academy concerned itself with public health as early as the first year of its life—endorsing a proposed law for the registration of births, deaths, and marriages, demanding legislation to control the import of drugs, and urging action for the care of youthful idiots. In the same year, 1847, the Academy appointed a committee to investigate an outbreak of typhus fever and took the unusual step of ordering the report to be printed in the daily Press as well as in medical journals. Not until 30 years after the foundation of the Academy did the library reach any size, but from the small number of 400 volumes in 1875 it rapidly expanded to some 9,000 volumes in 1879, and by 1880 it had acquired 17,000; there are now over 248,000 volumes. The Academy was housed in its present home at 103rd Street and 5th Avenue in 1926.

The Dutch Society of Psychiatry and Neurology will hold an international meeting in Amsterdam from June 13 to 15 to celebrate the 75th anniversary of the Society, and several leading psychiatrists and neurologists of England, Switzerland, Belgium, and Holland have already promised to read papers. The Dutch hope that specialists from the United Kingdom, with their wives, will attend the meeting. Those wishing to be present should communicate with the secretary of the Royal Medico-Psychological Association, 11, Chandos Street, London, W.1, by April 15.

Dr. William Smith, of London, S.E.3, was elected to the Greenwich Borough Council, South-east Ward, at the by-election on March 20. The polling was as follows: Dr. Smith, Conservative, 2,233; Mr. T. Smith, Labour, 976; Mr. A. Purvis, Liberal, 140. Dr. Smith stressed in his election address that local government does not need political parties and that decisions should be reached free of political prejudice.

Under a recommendation of the Wheatley Committee, approved by the Secretary of State for Scotland, student nurses in general hospitals with a four-year training contract who become State registered nurses before the end of their contract will, after April 1, be graded and paid as staff nurses. They will receive a salary of £120 a year, with free board, lodging, and laundry.

The chairman of the Australian Red Cross has instructed his London office to offer their entire Australian Red Cross stocks of food, clothing, and medicine for the relief of flood victims in Britain. He is also sending £A50,000 worth of food and clothing. He is reported by *The Times* (March 24) as having said that the Australian Red Cross would go to any length in a nation-wide effort to help the United Kingdom, and all the Society's resources were available for it.

The King Edward's Hospital Fund for London have recently issued a brochure entitled *Recommendations on the Employment of the Domestic Staff in Hospitals*. It is published by Geo. Barber, Ltd., Furnival Street, London, E.C.4, price 9d. net.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* a rise occurred in the incidence of scarlet fever 119, acute pneumonia 118, and cerebrospinal fever 21, while a decrease was recorded for measles 868 and whooping-cough 54.

A small increase in the notifications of scarlet fever was recorded in most areas, the largest local rise being 35 in London. The increase in cases of pneumonia was fairly general throughout the country and no large rise was recorded in any area.

The only change of any size in the local trends of diphtheria was a decrease of 11 in London. The notifications of cerebrospinal fever were the largest for any week since the beginning of 1943. The cases notified during the week appeared mainly as single cases spread over almost the whole country. The chief centres of infection were Yorkshire West Riding 12, Warwickshire 11, Middlesex 10, London 9, Glamorganshire 8, and Lancashire 6.

The incidence of whooping-cough showed considerable fluctuations; in the West Midland counties the cases increased by 57, while the largest decreases were Yorkshire West Riding 41 and Essex 32.

The largest falls in the notifications of measles were Lancashire 293, Middlesex 187, and Surrey 104; the largest increases were Glamorganshire 91 and Gloucestershire 85. The chief features of the notifications of dysentery were rises in Middlesex from 12 to 30 (Southall M.B. 23) and in Lancashire from 4 to 16.

In *Scotland* decreases were recorded for dysentery 22 and measles 19, and there were rises in the incidence of diphtheria 20 and scarlet fever 16. The rise in cases of diphtheria and scarlet fever occurred in Glasgow. No further cases of dysentery were reported from the outbreak in Banff county.

In *Eire* the chief feature of the returns was an increase of 84 in the notifications of whooping-cough; a new outbreak was reported from Tipperary, Roscrea No. 1 R.D., involving 81 persons, and there was an increase from 87 to 102 in Dublin C.B.

In *Northern Ireland* the epidemic of measles in Belfast C.B. continued to subside, notifications decreasing from 165 to 99.

Quarterly Returns for Scotland

The birth rate during the December quarter was 22.1 per 1,000 and was the highest rate for any quarter since 1926. The infant mortality rate was 56 per 1,000 registered live births and was the lowest ever recorded for a fourth quarter. The stillbirths were equivalent to a rate of 32 per 1,000 registered births. Maternal mortality was 2.7 per 1,000 live births and was 0.8 below the average of the five preceding fourth quarters. The general death rate was 12.7 per 1,000, being 0.9 below the five years' average. The death rate from tuberculosis increased. For all forms of tuberculosis the death rate was 79 per 100,000, and for respiratory tuberculosis it was 66, these rates being 8 and 9, respectively, above the rate for the fourth quarter of 1945, and 5 and 7 above the five years' average. There were 148 deaths from the principal epidemic diseases; they included: influenza 62, whooping-cough 33, cerebrospinal fever 21, diphtheria 16, and measles 13.

The preliminary statement for 1946 shows an annual birth rate of 20.3 per 1,000. The stillbirth rate was 32. The infant mortality was 54 per 1,000 live births and was the lowest rate ever recorded. The neonatal death rate was 30 per 1,000 and was 1 above the rate for 1945. The general death rate was 13.1 and was the lowest rate since 1939. Deaths from diphtheria numbered 91, the smallest number ever registered in Scotland. The death rate from respiratory tuberculosis was 64 per 1,000, and from all forms of tuberculosis 79. The former rate was 4 above the 1945 rate, while the latter was the same. The marriage rate was 8.9 per 1,000, and was 0.4 above the five years' average (1941–5) and 1.3 above the pre-war average (1934–8).

No. 11

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended March 15.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1947					1946 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	107	9	34	7	2	65	7	32	—	3
Deaths		—	7				1	—		
Diphtheria	184	9	54	16	3	475	33	55	50	13
Deaths	3	1	—		—	12	1	—	4	—
Dysentery	73	7	16	—	—	375	40	49	1	1
Deaths					—				—	—
Encephalitis lethargica, acute	1	1	—	1	—	3	—	—	—	—
Deaths		—					—			
Erysipelas			35	5	3			43	4	5
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				31					38	
Deaths	97	9	15		1	72	8	12	16	1
Measles*	11,269	499	227	26	104	1,605	430	537	43	—
Deaths	19	—	—		2	3	—	1	1	—
Ophthalmia neonatorum	78	9	28	—	—	60	2	12	1	—
Deaths										
Paratyphoid fever	5	—	—	—	—	1	—	1 (B)	—	1 (B)
Deaths	—	—	—		—	—	—	—	—	—
Pneumonia, influenzal	1,076	81	18	21	7	1,006	62	35	27	4
Deaths (from influenza)†	80	10	10		2	93	9	5	8	5
Pneumonia, primary			295	48				337	28	
Deaths		102			20		68		14	18
Polio-encephalitis, acute	—	—				—	—			
Deaths		1					—			
Poliomyelitis, acute	5	1	—	3	—	4	—	—	—	—
Deaths		—					—			
Puerperal fever		—	15		1		1	16		—
Deaths										
Puerperal pyrexia‡	148	7	9	—	1	134	12	21	1	—
Deaths		—					—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,336	114	215	19	40	1,143	88	164	31	14
Deaths	2	—	—		—	—	—	—	—	—
Smallpox	2	1	—	—	—	3	—	—	—	—
Deaths					—				—	—
Typhoid fever	6	—	1	—	—	6	—	—	7	1
Deaths	—	—	—		—	1	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths					—				—	—
Whooping-cough*	2,407	252	384	193	17	2,006	178	114	25	6
Deaths	22	1	9		3	6	—	—	3	—
Deaths (0–1 year)	630	80	85		22	441	51	69	56	22
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	7,456	1276	915		194	6,152	984	796	292	181
Annual death rate (per 1,000 persons living)			19·0					17·5	18·7	
Live births	10,166	1586	1164		315	7,685	1228	965	471	282
Annual rate per 1,000 persons living			23·4					19·4	30·2	
Stillbirths	317	40	38			259	29	38		
Rate per 1,000 total births (including stillborn)			32					38		

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.

† Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

‡ Includes puerperal fever for England and Wales and Eire.

Return of births and deaths for Eire for weeks ended March 8 and 15 is not yet available.

Any Questions ?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Treatment of Infertility

Q.—*A childless woman aged 38 who has been married for 5 years is desirous of having a family. She is perfectly healthy, and after thorough investigation no gynaecological defect has been found. The tubes are patent. A course of gonadotrophin did not produce the desired result. The husband's semen is normal. Can you suggest any treatment?*

A.—Every case of infertility has a cause—indeed, there are often several causal factors present in any one case. Although it is sometimes difficult to find any abnormality, the number of cases in which the findings are negative depends to a large extent on the completeness of the investigation. It would therefore be desirable to know what is covered by "thorough investigation" and on what evidence the semen is pronounced "normal." Has it been demonstrated that the woman is ovulating, and, if so, how often? If she is ovulating, what was the indication for giving gonadotrophin? Has the penetrability of the cervical mucus to spermatozoa been tested? Unless there is some guide to the cause, treatment must be empirical and the result is not likely to be satisfactory. It might be worth while arranging for the woman to keep a daily record of the vaginal temperature on waking, in order to determine the day on which ovulation occurs and the optimum time for coitus. Empirical lines of treatment which might be considered include tubal insufflations of carbon dioxide or injections of lipiodol immediately after menstruation for a few months, and pre-coital douches of 1% sodium bicarbonate or 1% glucose in Ringer's solution.

Pancreatic Grafts for Diabetes

Q.—*I was interested in the article (Oct. 19, 1946, p. 570) on the successful treatment of Addison's disease by a graft. Have pancreatic grafts been tried in the treatment of diabetes mellitus? Is the possibility that hypofunction of insulin is due to an overaction of the glycotrophic factor of the anterior pituitary likely to militate against the success of such a graft?*

A.—A successful pancreatic graft has not hitherto been recorded, though such grafting has been attempted. One of the chief difficulties is that the pancreas is a double gland, of which the acinous portion forms 99/100ths and the islands of Langerhans the remaining 1/100th. Since the acinous portion is not wanted by the diabetic patient this will inevitably degenerate and involve the islet cells in a mass of necrotic tissue. The islands of Langerhans can be destroyed by repeated injection of a crude pituitary extract, but it is believed that this does not occur in 75% of patients with diabetes, since the islet cells are apparently healthy when examined immediately after death. It may be an important factor in the remaining 25% of patients, where the β-cells are definitely unhealthy. Therefore a graft should not be injured by the secretion of the pituitary gland in the great majority of cases.

Abdominal "Cramps" and Duodenal Ulcer

Q.—*Where a diagnosis of duodenal ulcer has been established and the patient complains of severe "cramps" in the stomach can you suggest oral treatment* (a) *for the immediate relief of the "cramps," and* (b) *for the ensuing period? Injections are impracticable.*

A.—Persistent pain of colicky type never occurs as the result of duodenal ulceration unless the condition be complicated either by stenosis or by penetration of the ulcer and adherence to neighbouring structures. In either case surgery is indicated. In the absence of information about length of history, vomiting, relation of pain to food, etc., it is impossible to be precise about treatment. As a temporary measure ext. hyoscyam. liq. minims 15 (0.9 ml.) four-hourly will probably relieve the pain. This is considerably above the *B.P.* dose and may soon be reduced, provided dryness of the mouth be maintained.

Inheritance of Deaf-mutism

Q.—*A young woman is engaged to one of two healthy brothers whose parents were both deaf and dumb. Further details are not known. What are the chances of her children being deaf-mutes?*

A.—The fact that the deaf-mute parents had two normal children suggests that the deafness in one or both may have been due to a non-genetic cause—for example, meningitis or scarlet fever. Alternatively, as has been sometimes suspected in similar instances, the deafness in the parents may have been due to different recessive genes. It would therefore appear that at the worst the two sons are carriers of the gene; but unless the young woman herself also happens to be a carrier of the same gene all children will be normal. Unless she is a blood relative of the man, or unless she has a history of deaf-mutism in her own family, the chance of her being a carrier is small, and so the chance that a child of this marriage will be a congenital deaf-mute should be no more than one in some hundreds. It would be well to point out that there is a greater risk of a deaf-mute's appearing than in a marriage with no history of this kind, because however small a chance may be it will come off occasionally. But it should be emphasized how small the risk appears to be—considerably smaller, in fact, than the risk that any random pregnancy may end in a congenital malformation of some kind or other.

Discharge from the Nipple

Q.—*A married woman aged 44, who has no children but who has had several miscarriages, for six months has noticed a serous discharge from the left nipple, sometimes negligible in quantity but at times profuse. There is evidence of mastitis. What is the treatment?*

A.—A discharge from the nipple is due to irritation of a duct and almost always comes from the same duct. If it is turbid it may be due to changes related to chronic mastitis, in which case the treatment is that of the underlying chronic mastitis. If it is blood-stained it is evidence of a papilloma in the duct. In this case the duct may be identified by sealing it with collodion so that it becomes dilated. At operation a strand of silkworm gut may then be passed down the duct, or it may be possible to follow it by its distension and discoloration. If this manœuvre fails a local amputation of the breast is needed. If the condition is neglected it may become carcinomatous. A clear serous discharge is more likely to be due to papilloma than to chronic mastitis. It is not an urgent indication for operation but should be watched; operation will probably be needed eventually.

Marriage after Tuberculous Peritonitis

Q.—*A woman of 28 had tuberculous peritonitis of unknown origin twelve months ago; the ascites was drained midway between the umbilicus and pubes. She spent eight months in a sanatorium. Now the temperature and pulse are normal and there is no sign of the disease anywhere. Her nutrition is excellent, but the erythrocyte sedimentation rate is slightly raised. She is anxious to know if she is suitable for marriage from the point of view of health and sterility.*

A.—The patient's physical fitness for marriage depends to a large extent on what will be her living conditions afterwards. If she can continue an easy life there is probably no objection to marriage. If, however, she will be expected to undertake all the household work and to assume the many worries associated with housekeeping, then deferment of marriage for at least a further year seems desirable. If she gets married now, pregnancy should be postponed for not less than two years lest the pregnancy and labour or the added work involved in looking after the baby reawake a quiescent lesion. But, as the question implies, it is highly probable that the woman will prove sterile because the tubes are likely to have been infected or to have been occluded by peritoneal adhesions. This is no

inevitable, however, and could be demonstrated only by some test of tubal patency, salpingography probably being the best. Endometrial biopsy to exclude tuberculous endometritis might also be considered. However, all such procedures are best avoided at this juncture, for they may reactivate the disease. Indeed, unless her prospects of marriage are dependent on her fertility, there is much to be said for a policy of non-intervention until the marriage has proved unfruitful. The situation should, of course, be explained to the prospective husband.

M.C.V. in Pseudo-aplastic Anaemia

Q.—*Damashek and Schwartz (Medicine, 1940, 19, 231) point out that the macrocytic character of haemolytic anaemias is due to the presence of immature but normal erythrocytes in the circulation. Is the same explanation applicable to the high mean corpuscular volume of the erythrocytes in cases of pseudo-aplastic anaemia during a relapse?*

A.—Haemolytic anaemias are not necessarily macrocytic; for instance, in familial acholuric jaundice there may be microcytosis. The macrocytosis, if present, is probably due to at least two different factors. The most important is megaloblastic hyperplasia of the bone marrow associated with disorders of liver function, which can be demonstrated by investigation of liver efficiency. The second factor may be the presence of immature but normal erythrocytes. The latter cannot be the cause of a high mean corpuscular volume in cases of pseudo-aplastic anaemia in relapse, since in aplastic anaemia few if any young red cells are found in the peripheral blood. The question is, however, difficult to answer as the criteria for making a diagnosis of pseudo-aplastic anaemia are not given.

Trigeminal Neuralgia

Q.—*Is trigeminal neuralgia indicative of a psychogenic disease, or merely the natural consequence of a deterioration in the physical condition of the patient? Can a state of complete cure be attained by psychiatric treatment?*

A.—Genuine trigeminal neuralgia is not a psychogenic affection, and psychological treatment is not indicated. At the same time this disorder can scarcely be laid at the doors of any "deterioration in the general condition." Aetiology and pathogenesis are admittedly obscure, and the patient may be in good health apart from the presenting symptom—in the early stages at any rate.

Attacks of "Narcolepsy"

Q.—*Could you advise me as to the treatment of a lady aged 70 who has had attacks of narcolepsy for the last forty years? She sleeps well at night, but continually falls asleep during the day while sitting down. Amphetamine has had no effect. She has no past history of importance, but now has a mild generalized arteriosclerosis with some hypertension.*

A.—Narcolepsy in a woman of 70 must be a most unusual occurrence, and when, in addition, the patient is said to be resistant to amphetamine the diagnosis is rendered even more doubtful. Could not the case be one merely of "somnosis" in a cerebral arteriopath? Another question arises as to whether such a patient actually needs any treatment at all. Other pharmacological means for promoting wakefulness are, of course, ephedrine and also caffeine.

Contraception

Q.—*What is the most efficacious means of contraception in a married woman aged 25?*

A.—A "Dutch cap" vaginal pessary used in conjunction with a chemical contraceptive jelly or soluble pessary is the most satisfactory appliance as a rule. The size of the "Dutch cap" must suit the individual patient and care must be taken to instruct her in its use. The wearing of a condom by the male detracts to some extent from the pleasure of coitus and is expensive, but it has the great advantage of simplicity. Both methods are reasonably, but not absolutely, safe—the choice depends much on the views of the couple concerned.

Letters and Notes

Control of Measles

Dr. A. CRAWFORD MAYER (Brackley, Northants) writes: From the pen of one of the elder members of our profession, and one so well qualified, we should perhaps expect a more valuable contribution to our fund of medical knowledge than is provided in the short statement by Mr. Elwin Harris on the control of measles (March 8, p. 323). The articles referred to by Mr. Harris recommended the oiling of floors, bed-clothes, etc., in an attempt to reduce the bacterial content of the air. Mr. Harris apparently wishes us to believe that he achieves that object more simply by oiling the patient, a recommendation which conjures up in my mind the vision of his measles patients lying naked in bed, their well-oiled bodies serving as an area of attraction for the bacteria of the sickroom. If on the other hand Mr. Harris allows the oiled bodies of his patients to be covered by bed-clothes, I cannot understand how the oil can affect the bacterial content of the air. In support of his contention your correspondent remarks that he cannot recall a single case of otitis media complicating measles in his 22 years of general practice. As a scientific observation this statement is, I submit, of doubtful value. In science the verb should be "record," not "recall." In experimental science control cases are necessary. In my 12 years of general practice I also cannot recall a complicating otitis media and yet none of my patients was treated by oiling. Perhaps my cases are the control required to allow us to assess the scientific value of Mr. Harris's observations.

Endogenous Depression in General Practice

Dr. C. A. H. WATTS (Ibstock, Leicester) writes: I am obliged to Mr. H. I. Deitch and Dr. P. E. F. Frossard (Feb. 1, p. 208) for their information as to how psychiatric cases are dealt with in their parts of Britain. It is gratifying to find that there are more progressive systems than exist in this part of the world. I am in country practice near a large town with a very fine general hospital, but there is no psychiatric department worthy of the name. One day in each fortnight is allotted to country patients. If any case needs treatment he is referred to the local asylum. There is a university centre within forty miles, but again there are no facilities for E.C.T. or specialist treatment. I have found a psychiatrist who will give convulsive therapy privately, but his fees are far beyond any working-class practice. The only place to which I can refer cases is the mental hospital, which has no O.P. department. I think that to send mild depressives and anxiety states to an asylum is like referring all skin conditions to a Lock Hospital. I agree with Dr. A. Lionel Rowson (Feb. 15, p. 271) that it is high time the whole system was revised. Mental hospitals should house only incurables. No case should be referred to such an institution until every available measure has been taken to effect a cure in the psychiatric wing of a general hospital. O.P. departments in mental hospitals should be encouraged as a temporary measure until general hospitals have facilities and accommodation necessary. Psychiatry is very much the Cinderella of medicine.

Endocrine Receptors

Dr. H. BAB (London, N.W.3) writes: The theory of special receptors in tissue cells upon which the effectiveness of hormones depends, established by Mr. Aleck Bourne (Jan. 18, p. 97), is related to the fact sometimes pointed out in the past by various authors that hormone activity may depend on either deficiency of hormones or inability of a hormone to act upon a particular tissue (e.g., the pituitary thyrotrophic hormone in the exophthalmic ophthalmoplegic group, as discussed by Dr. S. L. Simpson, Feb. 15, p. 270). In 1917 I described nasal bleeding caused by oestrogen from the ovary in cases of amenorrhoea or oligomenorrhoea due to a hypoplastic uterus. Vicarious epistaxis is a substitute for uterine bleeding and a supplement in oligomenorrhoea. Certain chemical substances are capable of acting upon cells only if the cells possess suitable specific receptors. This factor determines the normal metabolism of nutrition and respiration. The same principle may be seen in the ovum that can be fertilized only by spermatozoa of the same or closely related species, in potassium cyanide acting only on certain cells, and in penicillin destroying certain micro-organisms and being harmless to others. There is a universal phenomenon, the principle of receptor activity in cell biology.

Bleeding Tooth-sockets

Dr. JOHN CAMBROOK (London, W.1) writes: There are certain measures I think should be added to your reply to the above question in the issue of March 8 (p. 322). Haemorrhage from tooth-sockets arises either from the soft tissues or the bony socket itself. Pressure either side of the socket with the thumb and forefinger

will markedly diminish the flow in the first type. In these cases a stitch passed through the gum either side of the socket and drawn tightly together coupled with biting upon a bolus of cotton-wool will usually suffice. Where haemorrhage is from the socket proper, the effect of biting upon a bolus coupled with the use of a four-tailed bandage if necessary should be tried. Where this is unsuccessful a mushroom-shaped plug of cotton-wool of such a size that the head can amply cover the socket and the stalk 1/4 in. (0.63 cm.) long is prepared. This is soaked in hot snake venom and the stalk placed in the socket so that when pressure is applied the venom mixes with the blood in the socket as it is occluded. Hot venom is used as its coagulative power is greatly increased for a few minutes before it becomes inactive, and it is during the first five minutes that its action is most helpful. When bleeding ceases the plug is left *in situ* so as not to disturb the clot, and it falls away after a few hours. In cases where the socket is already occupied by clot I have been successful in many cases by injecting venom into the socket and then using occlusion to prevent the escape of the mixed venom and blood. In cases where haemorrhage has been persistent the injection of morphine 1/4 gr. (16 mg.) has much to be recommended in calming the patient and lessening the bleeding. Finally, all patients should occupy an upright position, even in bed, until all danger of haemorrhage has ceased.

Sulphonamide Snuff for Colds

Dr. J. F. BUCKMASTER (Berkhamsted) writes: The reply to a question about sulphonamide snuff for colds (March 8, p. 322) suggests that the writer has had little practical experience of the use of sulphathiazole (with or without penicillin) in the common cold. Since Delafield, Straker, and Topley wrote their paper in the *British Medical Journal*, 1941, **1**, 145, six papers have been published describing over 700 treatments with antiseptic snuffs. Dr. Kenneth Hazell and myself did a large-scale experiment and satisfied ourselves and our patients that the powder-spray method materially shortened and mitigated the common cold by reducing the secondary bacterial invasion. In our experiment a total of 2 g. of snuff was given over a three-day period (some patients needed a little more for an extra 2 days). It is unlikely that any toxicity could arise even if the snuff were taken continuously for three weeks. Further, it is unusual for an adult to swallow mucus, and if the writer would try the experiment he would find that most of the snuff is blown out on the handkerchief. He would also find that the snuff so reduced the secretion that the necessity for blowing the nose arose only four or five times a day in the acute stage. He might even notice that congress with his fellows was less onerous and that at night a clear nasal airway was of some benefit, even if he slept alone. In the last sentence of the answer the writer suggests (perhaps unwittingly) that the snuffs are of some value in the secondary bacterial invasion of the common cold. In this I agree. Perhaps he would try some sulphathiazole and penicillin. It is a harmless procedure.

Intravenous Procaine

Dr. E. FALKNER HILL (Manchester) writes: In answer to the question "What is the action of novocain (procaine) when given intravenously?" (Feb. 15, p. 282) your correspondent says, "There are no records of a suitable dose for intravenous injection." In *Curr. Res. Anaesth.* (1946, **25**, 1) he will find a paper in which a number of cases are described and the dose given in each case. Some 15 years ago I had occasion to inject 0.3 g. of procaine intravenously in the course of 10 minutes. There appeared to be neither sign nor symptom as a result. The B.P. and respiration were unaffected, and the patient made no complaint of dizziness or other subjective sensation. As regards animals, an experiment in which 7.5 mg. was injected each minute into the jugular vein of a cat needed 24 minutes before paralysis of respiration occurred and then 2 minutes' artificial respiration was sufficient to enable the cat to carry on by itself. 0.18 g. for a cat is about equivalent to ten times the maximum dose of novocain used in clinical spinal anaesthesia. Procaine has been suggested as a suitable anaesthetic given intravenously for obstetric cases.

Testimonials for Released M.O.s

The Director General of Medical Services (Air Ministry, London) writes: The assistance of your *Journal* would be appreciated in clearing up a misunderstanding among released medical officers regarding the furnishing of testimonials by this Directorate General. A document of this nature, if it is to be of any value, must be written by someone who has a personal knowledge of the individual who requests it, and on this condition senior officers are empowered to give such testimonials. The practice in this Directorate General is to advise ex-Service doctors who write to us for testimonials to apply to senior officers of the medical branch under whom they have worked for a statement of their character and professional skill. Letters addressed to senior medical officers, care of this Directorate General, will be forwarded. A released medical officer may obtain a certificate of service based on the whole of his service by applying to the Under Secretary of State, Air Ministry (A.R.9), Kingsway, London, W.C.2.

Vasectomy and Sterilization

Lieut.-Col. F. R. W. K. ALLEN, I.M.S. (Berar, India), writes: With reference to the medico-legal case reported in the *Journal* of Jan. 18 (p. 118) under the heading "A Sterilized Husband" I should like to point out that a vasectomy is not 100% guarantee of a man being unable to impregnate a woman. I know of a case where vasectomy was performed and after a lapse of a year spermatozoa were found in the seminal fluid. I was present at the operation and I have seen the recent seminal fluid under the microscope.

Books for Germany

Dr. E. M. VERMEHREN writes: The Agency for Intellectual Relief in Germany, recently founded under the patronage of Cardinal Griffin, the Bishop of Chichester, and the Master of Balliol, is trying to help responsible Germans to reconnect themselves intellectually with the life and thought of Western civilization. It plans to establish in the British Zone several English lending libraries, where important English publications of recent years will be available to qualified German readers, who will themselves both run the libraries and select further titles. Specialized literature will be sent to institutions and individuals in Germany who need them for important work. Lists sent to us by German universities name the following medical books as urgently wanted: Joslin, E. P., *et al. The Treatment of Diabetes Mellitus.* 7th edition. Kimpton, 35s. 1941. Brock, Samuel. *The Basis of Clinical Neurology.* 2nd edition. *Williams and Wilkins.* $5.50. 1945. Wright, Samson. *Applied Physiology.* 7th edition. Oxford University Press. 25s. 1940. Wiggers, C. J. *Physiology in Health and Disease.* 4th edition. Lea and Febiger. $10.00. 1944. Boyd, W. *Pathology of Internal Diseases.* 4th edition. Lea and Febiger. $10.00. 1944. Burrows, H. *Biological Action of Sex Hormones.* Cambridge University Press. 42s. 1945. Darling, H. C. Rutherford. *Surgical Nursing and After-treatment.* 9th edition. Churchill. 12s. 6d. 1946. Todd, J. C., and Sanford, A. H. *Clinical Diagnosis by Laboratory Methods.* 10th edition. Saunders. 36s. 1943. Could we, Sir, through the courtesy of your columns appeal to your readers for help, not only to get these special books, but also for our work in general? We need both money—£5,000 in the next six months—and books; but only those books for which a demand has been expressed by the German readers "who have been spoon-fed much too long already and should at last be invited freely to select their intellectual diet." Those of your readers who have books to spare which they think suitable are invited to send a list to our treasurer. They will then be informed which of the books are wanted, and where they should be sent. Contributions in money should be sent to the Hon. Treasurer, C. P. Kininmonth, 4, Chapel Row, Wheeler End, High Wycombe, Bucks. We are trying to fight that intellectual starvation which, in the words of our patrons, "remains, after famine, the gravest immediate danger facing us in Germany; and it threatens, if allowed to persist, to destroy all chances for the reintegration of the German people into a peaceful and prosperous Europe." Surely, Sir, such a cause cannot fail to engage both the sympathy and the generosity of the majority of your readers?

Correction

In the *Supplement* of March 22 (p. 38), under the heading "Salaries of Medical Practitioners Engaged by Local Authorities on a Sessional or Case Basis," the fee paid general practitioners for diphtheria immunization when visiting a child at home and giving injections there is 6s., not 6s. 6d. as stated.

In the letter from Dr. J. P. McGowan (March 22, p. 389) the word "internationally" in the second sentence of the third paragraph should be "intra-nationally."

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